SCHOLASTIC

Teacher EDITION

Senior Scholastic

MARCH 18, 1953 • VOLUME 62 • NUMBER 7

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Teaching Aids for This Issue

A Lesson Plan on Industrial Research

How to Use This Issue

This issue contains a special section on *Industrial Research—Sparkplug of Progress.* It takes the place of the usual major feature articles on national and world affairs. However the regular news section and our usual back-page features—sports, Boy dates Girl, jokes, cross-word puzzle, etc., are included.

There is enough material in this special issue for several lessons. Many teachers, however, because of a crowded teaching schedule may have time for only one lesson. Point out the various articles to students for reading on their own. Here is a suggested teaching guide:

(a) *In American History and Problems of American Democracy:* pages 6-9. Also, see the lesson plan, *Using the Ads.*

(b) *In World History:* pages 6-9; 20-23; 29-32. Also, the lesson plan, *Using the Ads.*

(c) *In Economics:* pages 6-13. Also, the lesson plan, *Using the Ads.*

(d) *In Geography:* pages 6-13; 20-25. Also, the lesson plan, *Using the Ads.*

(e) *In Civics:* pages 6-9; 14-19. Also, the lesson plan, *Using the Ads.*

A quiz on the contents of the special issue will be found on page 3-T.

Science Makes Your Future (p. 6)

An interview with Dr. James R. Killian, Jr., President of the Massachusetts Institute of Technology, Dr. Killian points out the important part science and scientists have played in the continuing advance of our civilization. He indicates reasons why qualified young people should choose the field of science as a career.

Discussion Questions

1. Jobs for engineers are wide open today. Salaries are high. Yet industry is complaining about the lack of engineers to meet its needs. How do you account for this situation?

2. Does engineering appeal to you? Why or why not? Is engineering a man's job or is the field open to women also? Prove your point.

3. At M.I.T. and other engineering schools students are required to study courses in social studies and literature in additional to technical courses. How do you explain this stress on cultural background for science specialists?

4. If a Rip Van Winkle awoke from a hundred year sleep what changes in our civilization brought about by the work of our scientists would most amaze him?

5. Make a list of what are, in your opinion, the ten most outstanding achievements of applied science in the U. S. today.

Industrial Research—What's It All About (pp. 7-9)

The 20th century pioneer is the scientist working in his research laboratory. His tools are the test tube, the microscope, and many other scientific instruments. Leading industrial firms maintain industrial research staffs who work steadily at improving the products of industry, and originating new ones. The end product has been a higher living standard for America and the creation of thousands of new jobs and industries. Research has become the lifeblood of the competitive system.

Activity

1. The lesson plan on *Using the Ads* elsewhere in this section suggests a lesson procedure and activities to develop an understanding of the importance of industrial research. Working with the advertisements in this issue will give students a real understanding of the creative efforts and progress in industrial research.

2. What industrial laboratory developed the "transistor," and why is it important in electronics today?

3. The school's librarian can set up a library section or list of books as a guide for careers in science.

4. Students can write a paper on the theme, Science Remakes the Home.

People Who Work in Glass Houses (pp. 10-11)

This is an account of research at the Corning Glass Works in Corning, N. Y. Most of us tend to think of glass in terms of breakable stuff such as bottles and window panes. Corning's research scientists have given us glass products which we can use to wear, cook, build homes and put to many other important purposes.

Discussion Questions

1. In what ways has science opened a new "wonder world of glass"? (Call on students to give examples of glass being used (a) as wearing apparel, (b) in building homes, (c) in repairing boats, (d) in the field of sports and recreation, (e) in dressing up the home, (f) in the science laboratory, (g) in the doctor's office, (h) in the auto.)

2. How many of you own or have handled a glass fishing rod? How does it compare with metal and wooden rods?

3. Do any of you have fiber glass window curtains at home? What does your mother think of them as compared with window curtains made of other fibers?

4. How does the window glass in an automobile compare with the ordinary glass windows in your house?

QUIZ ON PAGE 3-T

NOTE: There is no quiz in the student edition this week. For teachers who desire an assortment of testing material, however, a quiz on this special issue appears on page 3-T, immediately following student edition.

Activities

1. Suggest to interested students that they write to the Corning Glass Works, Corning, N. Y. for further detailed information on the apprenticeship training program for a career in the glass trades. This information can be kept by the grade counselor for future reference in vocational guidance.

2. In preparation for the teaching of the lesson, or, as a lesson application, students can prepare a "glass products display." The display can consist of the actual product or pictures—or a combination of both.

Your Automobile—Where It Comes From (pp. 12-13)

Products from all over the world go into the making of the automobile. The article tells us about the basic materials and the world areas from which they come. Pictures show the automobile in the making and the research staff at work on some problems.

Activities

1. Distribute blank outline maps of the world to the class. Have students indicate by name tags the various world regions which supply the materials going into the auto.

2. This article can be used as the motivation for teaching a lesson on the importance of foreign trade and interworld relationships.

Careers in Science and Technology (pp. 14-16)

What future is open to young people in the fields of science and technology? What preparation and background do leaders of industrial firms look for in job applicants? Thirteen outstanding industrialists tell about the research work going on in their companies. They also hand out some sound, practical advice to high school students planning a career in science and technology.

Activity

This is must reading for students—from freshmen to seniors. Students who are planning a career in science and technology should check with their grade counselors now. Now is the time to see if they are taking the right courses for college entrance. Students can also write to technical colleges for entrance requirements. Give special attention to types of occupations that can be filled by high school graduates without advanced technical training.

Stick to Your Math (pp. 17-19)

A knowledge of mathematics is important to everyone. The fundamentals of addition, subtraction and division are used in everyday life by the consumer making his purchases, the cashier making change, the worker figuring the accuracy of his pay check. Going up the scale of more highly specialized and technical occupations a knowledge of higher mathematics is a necessity.

Procedures

1. Call the attention of your students to the chart listing the various occupations and their related mathematics requirements. Are your students planning their programs correctly to include the necessary math requirements? Are some of your students dropping out of mathematics who aspire to technical careers? Now is the time for them to get themselves on the right track. Suggest that they see their grade counselor to take a diagnostic test which will check their mathematics capacity. Suggest, also, that they take an aptitude test in the particular field of work in which they are interested.

2. One of the math teachers in your school can be invited to speak to the class during a home-room period. When he has finished, students should be encouraged to ask questions about the part mathematics will play in their particular vocational interest. If the discussion evokes sufficient interest, the math department in your school might want to carry the idea as a presentation to the entire student body in an assembly program.

Metal of the Moon (pp. 20-23)

A radio play originally presented over the air by Du Pont. The story deals with the untiring efforts of a young scientist, Charles Hall, as he works at the problem of extracting pure aluminum from raw materials.

Activities

1. Classes in English and dramatics can present the play during one of the regular class periods. Call on the better class dramatists to read the parts. The rest of the class can follow along as the "actors" read their parts. If your school owns a tape recorder it would be a good idea to put the play on tape. The fact that the play is going on tape will be sufficient motivation for the "actors" to do a super job.

2. As a follow-up to the reading and acting of the play, bright students can be encouraged to work in research committees to write original plays on the work of Louis Pasteur and Madame Curie. Other students can read books on famous scientific figures who have contributed to the advance of science.

3. Call the attention of the class to the Bell Telephone advertisement on pages 29-32. Interested students can write to Bell for information on career opportunities in the electronic field. Suggest, also, that they check through the other ads in this issue related to the theme of industrial research.

From Formula to Fiber (pp. 24-25)

A picture story which shows how Du Pont manufactures its "test-tube baby," nylon. Since the birth of nylon, Du Pont chemists have given us new laboratory fibers—Orlon, Dacron, Dynel, etc.

Activities

1. Ask the class to scan the advertisements in the pages of their newspapers which advertise products made of nylon, Orlon, and other synthetic fibers. These ads usually describe the exceptional virtues and qualities of these man-made fibers. Have these ads brought to class and read to show how important these man-made fibers have become in our everyday life.

2. Students who are interested in learning more about the man-made fibers can write to Du Pont, 2521 Nemours Building, Wilmington, Del., for free booklets.

Using the Ads

A number of the ads in this special issue were prepared especially on the theme of industrial research and on career opportunities in science and engineering. A good lesson (or lessons) can be developed from a study of the contents of these ads.

(Continued on page 3-T)

Coming Up!
in Future Issues

March 25, 1953

Foreign Affairs Article: The Coming Struggle for Power Inside the Soviet Union—Stalin may be dead but Stalinism lives on; the four factions involved in the new struggle for power and what each faction stands for; the men who head each faction and their backgrounds, international implications of the struggle.

National Affairs Article: Statehood for Hawaii—Hawaii's long-standing bid for statehood and what statehood would mean for Hawaii; how a territory becomes a state; Hawaii's importance to the United States; reasons behind the opposition to statehood for Hawaii; how the people of our 49th state live.

Forum Topic of the Week: Statehood for Alaska, Too?—The arguments on both sides of this controversial question presented objectively.

SENIOR SCHOLASTIC, published weekly during the school year Sept. through May inclusive except during school holidays and at mid-term. Entered as second-class matter at Post Office at Dayton, Ohio, under Act of March 3, 1879. Contents copyright, 1953, by Scholastic Corporation. Indexed in Readers' Guide to Periodical Literature. Member, Audit Bureau of Circulations. SUBSCRIPTION PRICES: $1.30 a school year, 65 cents a semester. Single subscription, Teacher Edition, $2.00 a school year. Single copy, 10 cents, except special issues so designated, which are 20c each. Office of Publication, McCall St., Dayton 1, Ohio.

Senior Scholastic

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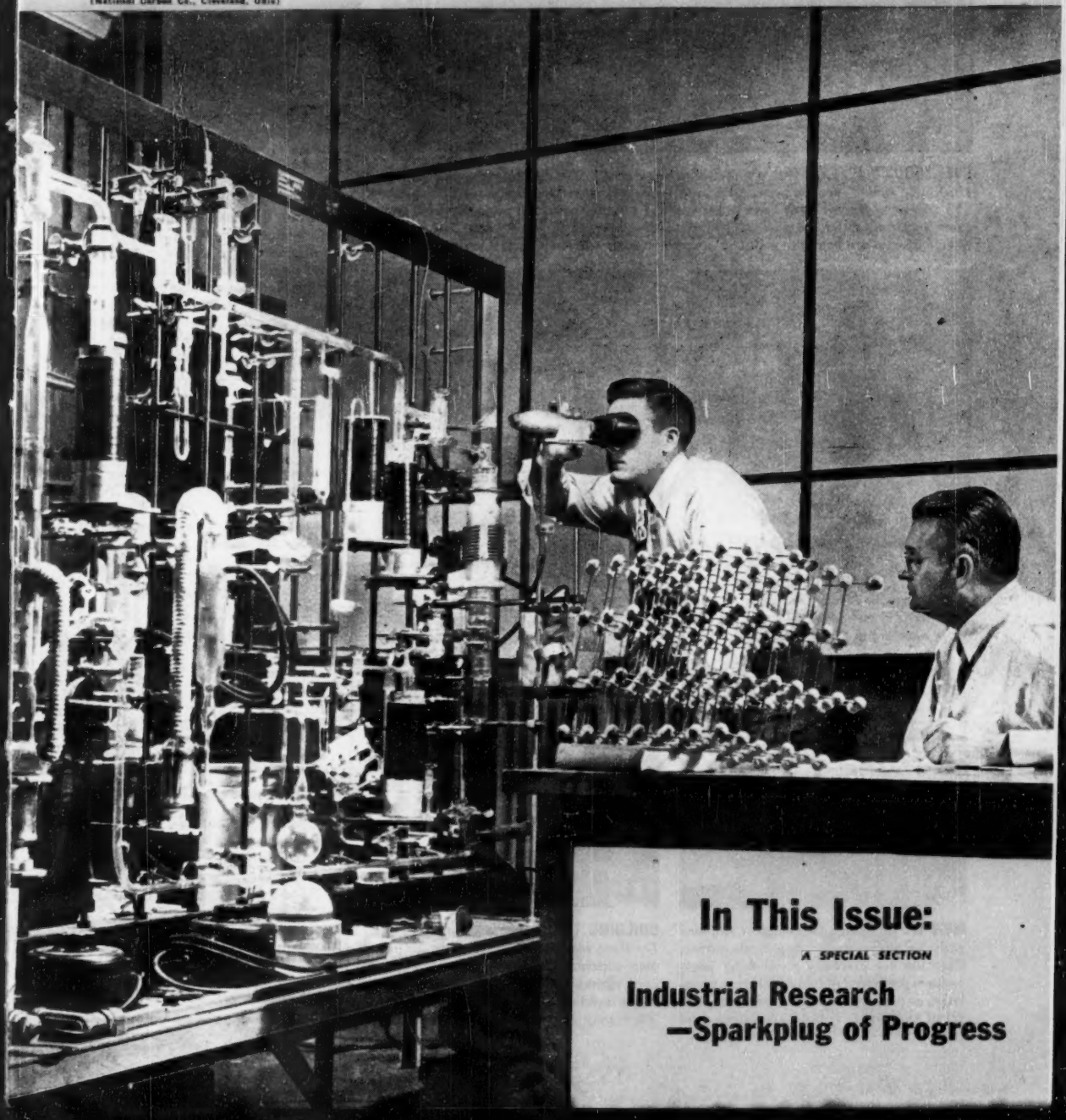
Research scientists determining the diffusion of carbon atoms by use of radioactive carbon. Model of molecule structure at right.

(National Carbon Co., Cleveland, Ohio)

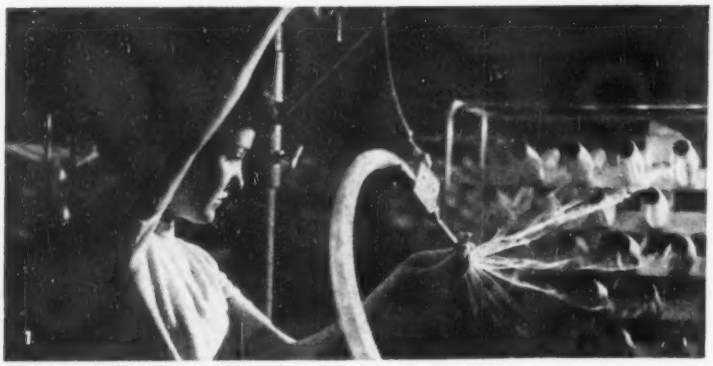


In This Issue:

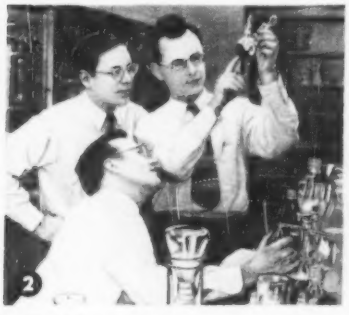
A SPECIAL SECTION

Industrial Research —Sparkplug of Progress

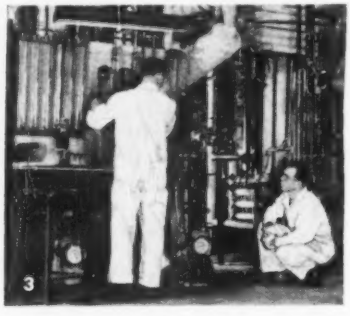
SCIENCE IN ACTION



EVERYBODY'S INTERESTED when industrial science brings forth a new product like Du Pont "Orlon" acrylic fiber. (It resists the weakening effects of sunlight, mildew and corrosive acids better than other organic fibers—makes possible sturdier curtains, clothing and industrial filter fabrics.) But few people are aware of how such developments are brought about in today's industry. Here is how it is done:

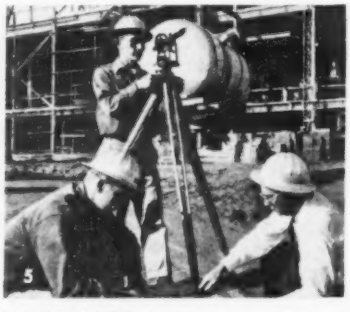


THE IDEA may originate in one man's head. Then teamwork is needed to make it a reality. Usually chemists develop a small quantity of the product in the laboratory so it can be tested to see whether it is something that people will buy.



IF IT shows promise, the next step is to make larger quantities for more thorough testing. So Du Pont engineers set up a miniature manufacturing plant. When the process calls for unusual pieces of equipment, they often invent their own.

NOW WE'RE ready to design a full-size plant for all-out production. Scale models like this are carefully studied by engineers experienced in manufacturing problems, and by instrument designers, electrical and power supply specialists, etc.



BUILDING THE plant is also a job for Du Pont men, for the Company does its own construction work. The services of civil, chemical, mechanical, electrical and other graduate engineers are required. They may also set up production lines.

EVEN WHEN the plant is built and the product marketed, Du Pont scientists continue to look for new ways to use it, and methods for making it better and cheaper.

Industrial research never ends. Right now hundreds of different projects are under way in the Du Pont laboratories . . . in scores of different fields, ranging from electrochemicals to rayon, from finishes to film. One of these days, with the right college training, *you* may join a Du Pont research group and participate in discoveries greater than any of the past!

Questions students ask Du Pont

How many kinds of engineering are there?

—G. V. C., Illinois

Modern industry uses the services of men and women specializing in more than 100 different engineering fields—in everything from ceramics and instrument design to forestry and building materials.

Where do Du Pont scientists make their headquarters?

—A. L. MacC., New Jersey

Eight of the Company's research groups are located in Wilmington, Del. Other laboratories are located in 11 states, from Connecticut to Texas. Scientists also work in sales offices or plants in 25 states.

Send your question about career opportunities in science to *Science in Action*, 2521 Nemours Building, Wilmington, Delaware.

DU PONT

REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
. . . *THROUGH CHEMISTRY*

E. I. du Pont de Nemours & Co. (Inc.)

Senior Scholastic

A National Magazine for Senior High School Classrooms. Published Weekly During the School Year.

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Office of publication, McCall St., Dayton 1, Ohio.

General and Editorial Offices, SENIOR SCHOLASTIC, 351 Fourth Ave., New York 10, N. Y.

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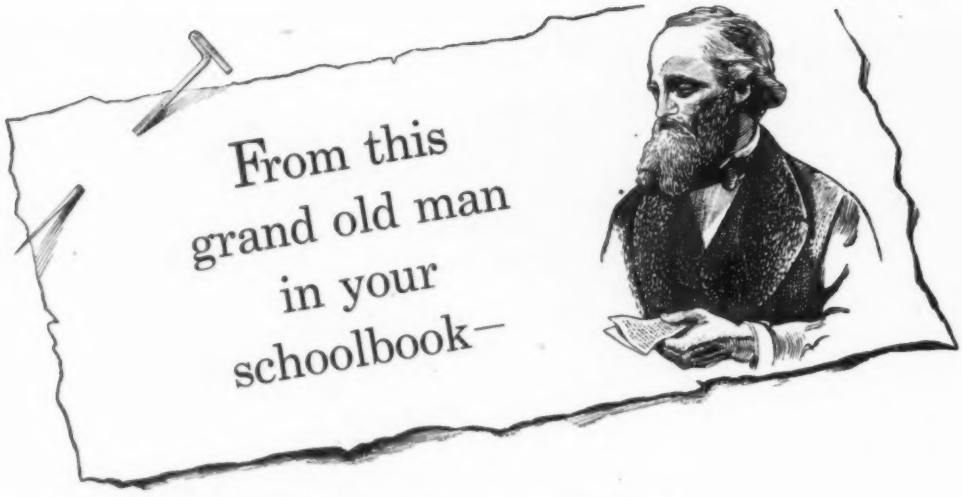
Be sure to Enter Mutual Benefit Life's BIG CONTEST Now!

There's still time to get your entry in, and you may win the $1,000 Government Bond or one of 27 other valuable prizes. But your entry *must* be postmarked before midnight, Tuesday, March 31.

All you do is write us—in your own words—"How I Would Use $1,000 in My Personal Plans for the Future." For example, if you figure it will be five years before you complete school and start earning your regular income, you might want to use one-fifth of your $1,000 to buy insurance now, and set the balance aside to pay premiums until you start working. That way your insurance would be paying you dividends—you'd be getting interest from your bank—you'd have money always available—and you'd have protection at very low rates!

That's only *one* way to use $1,000. Now sit down and write us how *you* would use it! Mail your entry to Mutual Benefit Life Contest, care of Scholastic Magazines, 351 Fourth Avenue, New York 10, New York.

THE
MUTUAL BENEFIT LIFE
INSURANCE COMPANY
Educational Division
300 Broadway, Newark, New Jersey



came this brand-new idea to make better car bearings

EVER wonder what the point is in learning the theories of such old-timers as the early physicists, Michael Faraday, Joseph Henry and James Clark Maxwell?

Well, our General Motors engineers could give you a very quick and serious answer. Particularly, right now, about James Maxwell in the case of engine bearings.

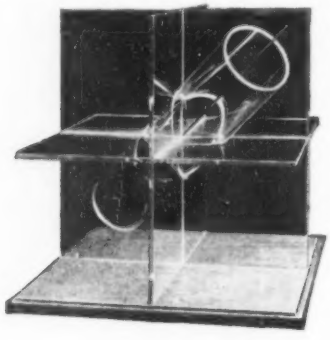
* * *

A BEARING, as you probably know, is a metal "cushion" which protects a moving part of an engine, such as the crankshaft, from excess wear. In recent years, as engines have become more and more powerful, the need to build engine bearings able to take over tougher punishment without splitting or cracking has increased by leaps and bounds.

Nearly a hundred years ago James Clark Maxwell set forth what is known as the Maxwell Theory of what happens to the energy absorbed by a piece of metal under terrific strain. And in their long and intensive research to improve bearings—marked by many major advances in bearing design and materials—GM engineers have recently found new clues to reducing bearing fatigue in this old schoolbook law.

By building the three dimensional plastic model (shown below) illustrating the application of Maxwell's Theory, they have come to conclusions which will help them design and build even longer-wearing bearings for cars, trucks, planes and tanks.

So don't ever take the old-timers in your books lightly. They may very well be helping unlock a problem right now for American industry. Just as they may very well help unlock a future for you as a much-needed scientist or engineer with such an industrial leader as General Motors.



GENERAL MOTORS

"More and Better Things for More People"

Your Key to Greater Value—The Key to a General Motors Car

CHEVROLET · PONTIAC · OLDSMOBILE · BUICK · CADILLAC
BODY BY FISHER · FRIGIDAIRE · GMC TRUCK & COACH
GM DIESEL · UNITED MOTORS SERVICE · AC SPARK PLUGS

Hear HENRY J. TAYLOR, on the air every Monday evening, over the ABC Network, coast to coast.

. . . and that's what we mean! This letters column, a regular feature, is open to opinion on any subject and criticism of any kind, brickbats or orchids. We want to know *what's on your mind.* Other readers do, too. Address Letters Editor, *Senior Scholastic*, 351 Fourth Ave., New York 10, N. Y.—*The Editors.*

What Europeans Think of Us

Dear Editor:

I read your article "What Do Europeans Think of Us?" in the January 21 issue and Claudia Jasper's opinion in the February 18 issue of *Senior Scholastic*. As I am an exchange student from Germany, I think I am a little bit of an authority on the subject.

I find there is nothing to add to the article and also the reasons given are sufficient and complete. A very good reason I find the one given by the Dane about the inferiority complex – and that's just human and unchangeable.

I stress particular importance on the statements given at the end of the article saying that the United States can count on the staunch support of the West Europeans.

Of course, it is inevitable and natural that difficulties arise whenever several people work together, and compromises must be made.

You go to bed one evening in Europe under a democratic government and never know whether you will not awake in the morning under Communist rule. This threat naturally gets on people's nerves and sometimes causes harsh words against anyone.

There are always prejudices against new things and some Europeans just don't like "bop" music and Western movies (I myself like both) in their own country as Americans certainly would not like Spanish bull fights or Bavarian beer festivals being introduced into their country.

But all these are minor differences brought forth by some individuals and change nothing in the fact that we are friends, need each other's help today more than ever, and that Europe acknowledges gratefully the American efforts to help her.

So, whenever such incidents occur, let us smile, have some humor, and remember that it is a privilege of good friends to criticize each other.

Don't you agree with me, Claudia?

Hubert Linhart
Spartanburg High School
Spartanburg, S. C.

Answers to last week's puzzle

■	C	A	R	B	U	R	E	T	O	R	S	■
C	■	H	O	T	■	■	■	P	I	T	■	W
R	U	■	D	■	A	G	E	■	L	■	S	H
A	S	K	■	S	T	E	E	R	■	S	U	E
N	A	■	F	■	E	A	R	■	H	■	N	E
K	■	L	O	G	■	R	■	S	O	B	■	L
■	■	E	R	A	■	■	■	E	R	E	■	■
S	■	A	D	S	■	H	■	A	N	T	■	A
H	P	■	S	■	F	O	E	■	S	■	A	X
A	A	A	■	C	H	O	K	E	■	N	I	L
F	T	■	P	■	A	D	E	■	A	■	R	E
T	■	V	I	A	■	■	■	D	I	M	■	S
■	W	I	N	D	S	H	I	E	L	D	S	■

Fact Finders

By Katharine Lowery, Avonworth H.S., Ben Avon, Pa.

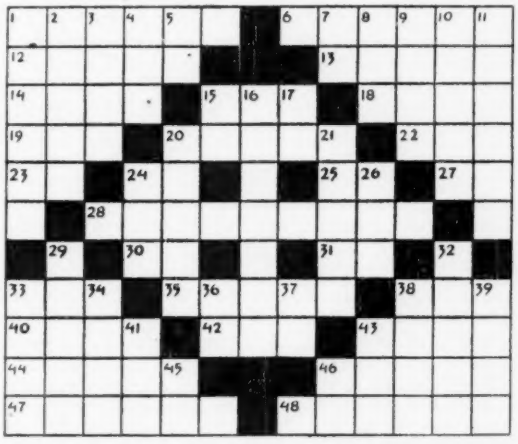
***Starred words refer to science and invention**

ACROSS

° 1. Invented first successful airplane.
° 6. Proposed atomic theory in 1803.
°12. Fleming and De Forest, early pioneers in ——.
13. Capture.
14. Paradise.
15. Health resort.
18. To shine.
19. Civil Aeronautics Administration (*abbr.*).
20. To be in an upright position.
°22. High explosive developed in 19th century.
°23. Chemical symbol for krypton.
24. Neuter pronoun.
°25. His theory is relativity (*initials*).
27. Ex officio (*abbr.*).
°28. Greek philosopher and scientist.
30. Half the width of an em.
31. Either (*abbr.*).
33. Spinning toy.
35. To pack into a bundle.
38. Trick, cheat.
°40. Waste matter of metal ore.
42. Exist.
43. Additional amount.
44. Collection of maps.
46. Danger.
°47. He isolated helium.
°48. Discovered much about heredity.

DOWN

1. Destroys, ruins.
° 2. Detecting device of great use in World War II.
3. Concept, notion.
4. Card game: —— rummy.
5. Cry of surprise.
7. Like.
8. Limb of the body.
9. Lean, tip.
°10. Allotropic form of oxygen.
°11. Formulated laws of gravity.
15. Street (*abbr.*).
°16. Founded the science of bacteriology.
17. Indefinite article.
20. Restrict.
21. Tropical fruit.
24. Anger.
°26. Invented cotton gin.
°29. Developed voltaic cell.
°32. Discovered radium.
33. Former Russian ruler.
34. Part of the hand.
36. Egyptian sun god.
°37. Chemical symbol for selenium.
°38. Early automotive pioneer.
°39. Invented the telephone.
°41. Faraday, the first to make a liquid from a ——.
43. Male human beings.
°45. Chemical symbol for samarium.
°46. Professional engineer (*abbr.*).



Students are invited to submit original crossword puzzles for publication in *Scholastic Magazines*. Each puzzle should be built around one subject, which may be drawn from History, Art, Science, or any other field of knowledge. Maximum about 50 words, of which at least 10 must be related to the theme. For each puzzle published we will pay $10. Entries must include puzzle design, definitions, answers on separate sheets, design with answer filled in, and statement by student that the puzzle is original and his own work. Give name, address, school, and grade. Address Puzzle Editor, *Senior Scholastic*, 351 Fourth Avenue, New York 10, N. Y. Answers in next issue.

INTERVIEW OF THE WEEK

Science Makes Your Future

J. R. Killian, Jr.

Shake Hands with Dr. James Rhyne Killian, Jr.
President of the Massachusetts Institute of Technology

By KENNETH M. GOULD

"FIFTY years ago America had only one engineer for every 250 employed workers of all kinds. Today, in 1953, there is one engineer for every 60 other workers. And we have by no means reached the end of this trail."

The words came from a friendly, easy-to-talk-with, solidly built six-footer. He looked as if he might be just as much at home in a checkered shirt around a hunter's campfire—and in his spare moments he is. This is Dr. James R. Killian Jr., the young (48-year-old) president of Massachusetts Institute of Technology, at Cambridge, Mass., probably the most important school for technical training in this country.

We were sitting in Dr. Killian's big, sunny, modern office in the central bloc of domed and pillared buildings facing the Charles River Basin, which constitute the heart of this great "university of the sciences." When you enter this fabulous place, the doors swing open before you by the magic of selenium (photoelectric cells). Push a button, and lights flash on a huge colored map to show you where to go. If you explore further on the crowded 100-acre campus, you will find yourself in some of seventy special laboratories. There world-famous scientists and their lucky students are constantly asking themselves the questions, "How does it work?" and "Why does it happen?"

Brains—Mechanical and Human

They are laboratories that house some of the rarest and most expensive equipment in the world. Here are the "whirlwind computer" and other giant mechanical brains built by M.I.T., the cyclotron, or the high-voltage generators for electrical engineering. You can visit the Wright Brothers Memorial Wind Tunnel and the Supersonic Laboratory, the Nuclear Science (Atomic Energy) and Electronics Research Laboratories, where radar was invented.

Each scientific field, said Dr. Killian, tends to follow an S-shaped curve in its growth. The number of engineers, now about 400,000, has been doubling every twenty years. The 100,000 chemists double every fifteen years. Physics is a younger science; it has only 20,000 physicists, who double every eight years. It has been having a rapid growth since World War II, due partly to the atomic energy field, but even more to the jump in electronics and optics.

American industry, entirely apart from the defense crisis, now needs from 30,000 to 40,000 *new* engineers every year. It is not getting them, because enrollment in engineering schools fell off badly a few years ago. For some reason, the notion got around that engineering is a crowded field, and high school students have sometimes been wrongly advised not to enter it. But all signs point to an even greater shortage of trained engineers, chemists, and physicists from 1955 to 1960. And incidentally, these fields are by no means closed to girls! The number of women in chemistry and the biological sciences is growing rapidly.

"Why should young people be interested in science these days, anyway?" we asked Dr. Killian. "Haven't we had enough technical progress—too much, maybe, when we think of what a hydrogen bomb can do?"

"That's a tough question, all right," smiled M.I.T.'s prexy, "but I think I can answer it. I'll admit we live in a grim and uncertain world, and science doesn't have all the answers. Perhaps we expect too much of it. But I'm an optimist about the future of the human race. Science is not limited just to making destructive weapons. It has limitless frontiers of improvement in social welfare and human relations. The universities and foundations are spending great sums today on research in the fields of psychology and communications. We are studying how people and nations can get to know and understand each other better.

Science Has a Job for You

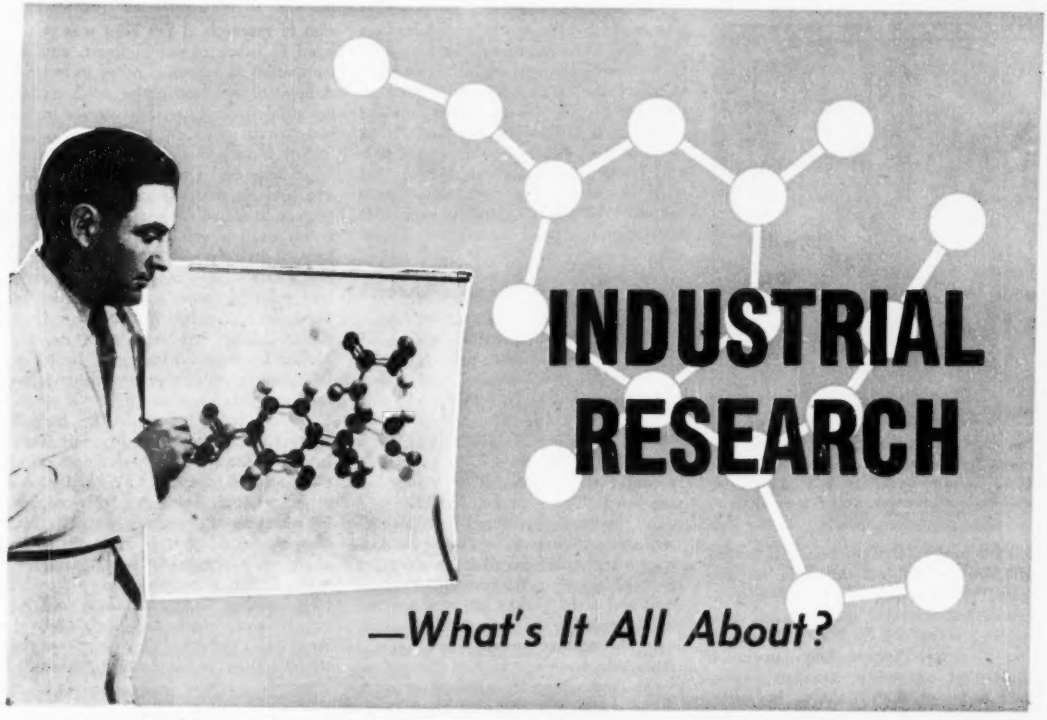
"Four hundred years ago a few far-seeing men like Lord Bacon began to think about 'the invention of invention.' They started a process which swelled into a flood in the nineteenth and twentieth centuries. Through this process the experimental findings of men in the scientific laboratories can be applied by other men in the shops and factories to the making of a thousand things for the comfort, health, and happiness of mankind. They gave us the foundation on which modern industry has built the highest standard of living in the world for the most people.

"We cannot stop there. If we want to go on creating a humane, intelligent world in which all the millions of human beings can enjoy the good things of life, more and more people must understand the scientific process. More and more able and ambitious young men and women must choose science for their careers."

"How about you, Dr. Killian?" we asked. "When you went to high school in Georgia, and to Duke University in North Carolina, did you have a clear idea of your goal in the technical sciences?"

"No indeed," he admitted cheerfully, "I'm afraid I'm a

(Continued on page 33)



INDUSTRIAL RESEARCH

—What's It All About?

(Above left) At Parke, Davis & Co.'s Holland (Mich.) plant, a chemist shows structure of the "wonder drug," chloromycetin.

HOW well do you think your radio or TV set would operate without those rows of vacuum tubes? Yet they are among the most delicate and expensive parts of your machine. Without them, you could not hear the weak electric vibrations carried over the airwaves.

Ever since the dawn of electronics, physicists have sought for a cheaper and more reliable way to amplify an electric current. About five years ago two scientists working at the Bell Telephone Laboratories, W. H. Brattain and John Bardeen, found the answer. Instead of delicate glass, filaments, and vacuums, they found a solid that would amplify better than the best tube. It is a little sliver of crystal called "germanium"—one of a group of strange metals known as semi-conductors. Brattain and Bardeen found that a current entering one face of a germanium crystal emerged from the opposite face with an amazing increase of power. This object, no larger than a pea, connected to three little wires, they called a "transistor."

For many uses the tiny transistor seemed destined to replace the far more bulky and less durable vacuum tube. But years of additional research at the Bell Laboratories were necessary.

Their success is demonstrated by the transistors now in use—rugged and compact devices which amplify sound 100,000 times, and do not require one *millionth* of the power of the smallest vacuum tube. Even the earliest versions of the transistor are estimated to have a lifetime of about ten years, in contrast to the shorter life of vacuum tubes.

Engineers foresee the day when vacuum tubes and their socket connections will be largely eliminated from electronic devices; when electronics will be extended into fields where the vacuum tube is not practicable; when entire circuits, including the transistors, will be embedded in protective plastic packages. Already transistors are helping to reduce the size and improve the performance of electronic devices ranging from computers to portable radios. A new word—"transistorizing" is heard in the electronics world, as engineers eagerly study ways to use the transistor in improving a thousand products.

Applied vs. Basic Research

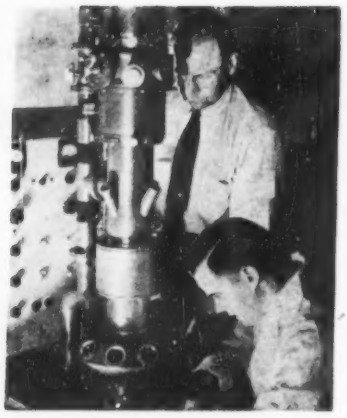
The work which resulted in the invention and commercial development of the transistor is the kind of work that goes on every day in thousands of industrial laboratories for *applied research*. This kind of research is aimed at solving problems of practical importance, and it is undertaken because it is expected to lead to practical rewards. Applied research may include fundamental studies which will contribute to the success of the research project. In the case of the transistor, for example, a great deal of fundamental research on the structure of the germanium crystal was necessary.

But when a scientist chooses his problem and his methods of solving it only because he is moved by the spirit of scientific inquiry, we do not call his work "applied research." Such research, conducted mainly to enlarge man's boundaries of knowledge, is known as *basic research*. Basic research is carried on largely in universities, and to some extent in Government laboratories, but only rarely in industry.

Most of the research performed in the United States is applied research, and much of it is performed in industry's own laboratories. Industrial firms also sponsor a great many specific research projects in universities and research foundations. Many large companies award research fellowships which enable promising young scientists in universities to do basic research on problems of their own choosing.

Industrial Research Is Born

Forty years ago it was hard to find an industrial research laboratory in the whole United States. Today there are



The electron microscope, important and costly instrument, was developed at the RCA laboratories by Dr. V. K. Zworykin, well-known inventor, and research team.

3,300 such laboratories, employing 165,000 people. All this is a far cry from the early days when a few well-established chemical and electrical companies such as E. I. du Pont de Nemours and General Electric first persuaded competent university scientists to devote some of their time to industrial problems. At that time, these companies were mainly interested in testing devices for better control of production processes. But as faith in industrial research increased, its role was gradually extended to improving the products of industry and production methods.

In many instances, the research scientist became a businessman, emerging from the laboratory to organize a new industry based on his own discoveries. Hall, who developed the first practical method of extracting aluminum from bauxite; Baekeland and Hyatt, who developed the earliest commercial plastics, bakelite and celluloid; Acheson, the discoverer of carborundum, an abrasive harder than steel—all these were researchers turned businessmen.

Their success stimulated other segments of American industry to establish research laboratories. Soon many companies were finding that research was good business. It created better products, which led to higher profits, thus enabling them to invest in still more extensive research. It is estimated that for every dollar now spent on research, three dollars in profits are being obtained as a result of past research. The process is circular and continuous.

A typical example of how industrial research has changed fundamental processes is that of U. S. Steel and the manufacture of tin plate. Up to 1937, all the tin plate produced in the world was made by the costly and laborious "hot dip" tinning process. In that year U. S. Steel scientists set up a pilot line to study the continuous production of tin plate by electrolysis, which deposits atoms of liquid tin on the underlying sheet of steel. Since then dozens of patents have been taken out representing improvements in the electro-deposition process. As a result, today over half our tin plate output is produced by the electrolytic process.

Free Enterprise Encourages Research

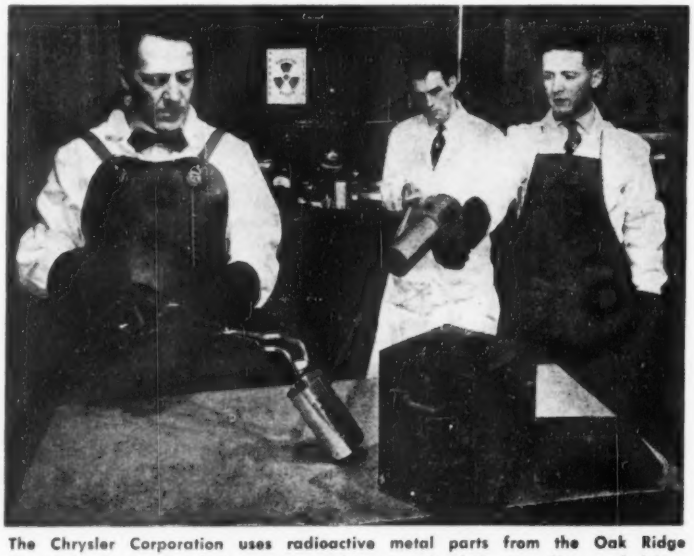
The freedom of American enterprise also encouraged industrial research. A company which did not seek endlessly to improve its products and lower prices by means of better production processes soon found itself at a competitive disadvantage. Businessmen with pioneering instincts saw in science a revolutionary method of meeting human needs. These men realized that the basic research performed in universities, although it is a necessary foundation for technological advance, does not by itself develop the products people need and want. Unless industry applied the knowledge gained through basic research, science would have only a minor effect on our way of life.

Du Pont offers an excellent example of the major role research plays in industry today. The company maintains 40 laboratories throughout the nation, employing 1,800 researchers, and an additional 3,200 other employees to assist them. Before World War I, Du Pont spent $300,000 a year on research. Today it spends $38,000,000. The expansion of research at Du Pont was paralleled in other chemical firms, and by companies in scores of other industries. A flood of new and better products has emerged from these laboratories in the last twenty years.

Nor is industrial research limited to large firms like Du Pont, General Electric, and Standard Oil. Small firms also engage in active research. If a company is too small to establish its own laboratory, it can hire the laboratory facilities and the services of highly competent scientists and engineers from independent research institutes or foundations. The first such institute, the Mellon Institute for Industrial Research, handsomely endowed by the Mellon family, was founded in 1913 at the University of Pittsburgh. The Battelle Memorial Institute, the Franklin Institute, the Armour Research Foundation, the National Research Corporation, and other research institutes followed, enjoying remarkable success. In 1950, nine of the major research institutes, operating on a non-profit basis, employed over 1,500 scientists and engineers, plus another 1,000 technical and administrative workers. Their bill to American industry "for services rendered" runs to about $40,000,000 a year.

How a "Research Team" Works

The research scientist or engineer of today is no longer the "lone wolf" inventor of the past. Individual initiative and creative ability are as essential as ever in research, but something new has been added—teamwork. The re-



The Chrysler Corporation uses radioactive metal parts from the Oak Ridge (Tenn.) U. S. Atomic plant, to test engine wear in their cars. Here technicians are handling a "hot point" and a Geiger counter under careful safeguards.

search worker functions as a member of a team assigned to solve problems. He may specialize in chemistry, physics, metallurgy, aerodynamics, thermodynamics, chemical or mechanical engineering, or any of a dozen other fields. But whatever his field, he merges his knowledge and experience with those of other members of the research team. Each team is headed by a project supervisor, or group leader, who periodically reports to the research director.

In World War II, for every front-line soldier on combat duty, it required 17 civilian workers behind the lines to keep him supplied. The research team-worker is the "front-line soldier" of industry. For every such scientist there must be from five to fifteen technical and non-technical workers who support his efforts. A chemist, for example, will have the aid of a laboratory assistant, literature researcher, librarian, patent chemist, glass blower, instrument maker, instrument mechanic, electrician, machinist, safety inspector, draftsman, and other trained personnel whose services he may require.

But modern industrial research demands even more than trained men and women. It also requires complex, and often fabulously expensive, tools. Industry spends literally millions of dollars on such research instruments as the electron microscope, which can magnify from 80,000 to 100,000 times; small-scale computers and large-scale "electronic brains" which save many thousands of man-hours formerly spent in calculation; mass spectrometers, to identify the different molecules found in gases and other substances that can be vaporized; ultracentrifuges, which subject test specimens to a force about 260,000 times that of gravity; the helium cryostat, which will produce temperatures close to absolute zero, or −460°F.; wind tunnels to study the behaviour of aircraft at supersonic speed —the list is almost endless. Small companies cannot afford costly machines of this type. Only the larger industrial and university laboratories can do so.

General Electric's weather scientist, Vincent Schaefer, produces a miniature snowstorm in a home freezer, under the watchful eye of Dr. Irving Langmuir, famous physical chemist (upper left), at GE's Schenectady research laboratories.

Women technicians play an important part in chemical and biological research. At the Mound Atomic Laboratory, Miamisburg, Ohio, run by Monsanto Chemical Co., researchers check weight of white rats which have had radioactive doses.

The Fruits of Research

The value of industrial research cannot be estimated in dollars and cents alone.

What price could be placed on such life-saving inventions as the X-ray tube, on radioactive isotopes used in the treatment of cancer, or on the antibiotics and other "wonder drugs" pioneered and developed by the pharmaceutical industry, and brought within the financial reach of all? How shall we estimate the value of the advances made in radar, television, radio, aircraft and automotive design, textiles, plastics, and other fields by scientists and engineers working in industrial laboratories? Not only has industrial research raised our standard of living and immeasurably enriched our way of life, but it has also provided employment for millions of people by creating entire new industries and countless business enterprises.

Industrial research, as we know it today, is still in its childhood. It looks forward, with the eagerness of youth, for new worlds to conquer in electronics, synthetics, atomic energy, jet and rocket propulsion, and other fields as yet largely unexplored. Does the future hold three-dimensional color television, automatic factories controlled by electronic devices, atom-powered aircraft, jet-powered helicopters in the family garage, atmospheric conditioning, antibiotics that will conquer all the virus diseases? The answer will come in large part from the research laboratories of industry. Thousands of men and women are working this very day to make all these wonders come true.

People Who Work

The Story of Research at the Corning Glass Works

"WHAT can you do with glass besides look through it and drink out of it?"

Science began asking that question about half a century ago—and opened up a whole new "wonder world of glass." Nowadays, if you ask what you can do with glass, the answer would be:

"You can wear it, cook in it, build a boat or a house with it, whittle it, take photos in it—and that's just a starter."

The glass most of us are used to is stiff, breakable stuff—bottles and window panes, for instance.

But at the Corning Glass Center at Corning, New York, I saw:

. . . Plate glass so springy that it's used for diving boards.

. . . Fiber glass that you can weave on a loom.

. . . Safety glass (glass-plastic "sandwiches") that can stop a bullet.

. . . Heavyweight glass (70 per cent lead) that can stop atomic rays.

. . . Featherweight "foam glass," so buoyant that it's sometimes used in liferafts.

. . . Those new "cousins" of glass—the silicones: They pinch-hit for oil as a lubricant, are used for waterproofing and in varnish, and in another form, have many of the qualities of rubber.

Where did all these new kinds of glass come from?

Corning's "Idea Men"

A lot of them were "born" in an unassuming four-story building set in the midst of the bustling factory area of Corning Glass Works (which operates the Corning Glass Center). Opening off its glass-brick corridors are lab rooms where earnest men in white coats move mysteriously amid a forest of complicated glass apparatus. In book-crammed offices, scientists dream their dreams for an all-glass world.

This is CGW's laboratory building. About half the 300 people who work there are physicists, chemists, and engineers. They're the "idea men" who are building the future of Corning Glass—as they have built its present.

Dr. Edward U. Condon, director of research at Corning Glass Works, told me: "Sixty per cent of Corning Glass Works' business today is in products that didn't even exist commercially ten years ago."

Of the nation's 250 glass factories, employing about 125,000 people, Corning Glass with 14,000 workers is one of the larger units. It is the world's largest producer of technical glass (such as laboratory glass, signal ware, and special glasses for industry and research).

Corning owes its leadership largely to CGW's "wedding" with science. This is the "diamond anniversary" of that wedding. It happened 75 years ago, when CGW was a struggling little factory of about 100 workers. Among its products were signal lenses for railroads. Patterns of ridges were molded on the outside of these lenses. These ridges acted as prisms, to concentrate the light beam in the desired direction. Railroads complained about the lenses. "Dirt and snow collect in the prisms," they said, "and block off the light."

Corning asked a Cornell University scientist for advice. With his help, CGW worked out a way to mold the prisms on the *inside* of the lens. Then the outside was smooth and easily cleaned.

It was the first time the American glass industry had ever called on science to help solve its problems.

Now the lenses were better—but the colors weren't right. They were weak and hard to see. A Yale scientist helped Corning develop a set of signal-glass colors that were adopted in 1907 by all U. S. and Canadian railroads.

Corning and science made their partnership permanent. In 1908 Corning called in a chemist, Dr. E. C. Sullivan, to set up a research laboratory—the first in the U. S. glass industry.

The railroads had still another complaint. "What can you do about those glass chimneys you make for brakemen's lanterns? They're always breaking in bad weather."

Metal, you know, expands when it's heated and shrinks when it cools. Glass does the same thing. What happened was this. The flame in the brakeman's lantern heated and expanded the *inside* of the glass chimney. Rain or snow, beating on the lantern, chilled and shrank the *outside*. This literally pulled the glass apart.

"We'll have to invent a brand-new kind of glass," CGW's scientists decided. They tried adding boric acid to the glass mixture. It worked! The new glass didn't shrink or expand much with temperature changes. After that the brakeman, swinging off his caboose on a nasty night, could be sure his lantern would burn steady and true.

The laboratory kept improving this new glass. Among other things, it was used for storage-battery jars. Dr. J. T. Littleton took one of these jars home with him one day in 1915. The next day his startled co-workers were offered a piece of cake baked in the jar.

Cooking in glass! Nobody dreamed of such a thing before 1915. Nowadays glass cooking ware is in nearly everybody's kitchen.

A "Glass Cookbook"

And CGW goes on "cooking" new glasses. For thousands of years the only way known to make glass was to mix sand, soda, and powdered limestone and

GLASS FOR COOKING: New designs and new ways to use Pyrex baking ware and kitchen glassware are tried out in the Test Kitchen at Corning Glass Works.

GLASS FOR ART: The Paul Revere vase, designed by sculptor Sidney Waugh in "Steuben" crystal—a glass made with lead, for clarity and "sparkle."

in Glass Houses

By STURGES F. CARY

melt them together. (This is still the commonest and cheapest kind of glass.) But Corning stirred in all kinds of other materials. Corning's "glass cookbook" has 50,000 different "recipes."

"Our assignment is to take the whole table of elements and see what we can make," says Dr. W. W. Shaver of CGW's laboratory.

"The industrial laboratory is basic to our competitive free enterprise system. If we didn't have a laboratory, we couldn't hold our own against our competitors. And our competitors are not only glassmakers, but makers of metals and plastics, too. We must have the organization to study our materials and learn how to use them in new ways."

To show where a new idea will sometimes take you, Dr. Condon told me this story:

About 15 years ago Dr. Robert Dalton noticed something interesting: A certain kind of red glass would take on its color more quickly if exposed to ultraviolet light.

CGW scientists wondered: "Is this a clue to a way to make photographs in glass?" Dr. S. D. Stookey went to work. He took certain metals that are sensitive to light and mixed them into the glass.

Before long he had worked out a way to take photos—not *on* glass—but *in* it. These photos don't fade or get dirty. They have a "three-dimensional" look.

While CGW began marketing this "photosensitive" glass, Dr. Stookey was busy with something else. He found that in certain glasses milky particles would grow around the metal particles after exposure to ultraviolet light. He could produce a pattern—any pattern—in the clear glass.

Suggested John Hoxie: "Some buildings have metal louvers over their lights so that the light will shine straight down. Why not make glass louvers right in the glass light fixtures?" So CGW laboratory research created another new product.

But that wasn't all. Dr. Stookey found that acid didn't bother the clear glass, but ate out the milky pattern. Result: The birth of "chemical machining." By photography and acid, Corning can mass-produce a piece of glass with any kind of holes or indentations you want.

What use is that?

"Take color television," says Dr. Condon. "In the TV tube, the light has to pass through holes exactly placed in a screen, and strike a pattern of colored phosphor beads. We could make that screen by 'chemical machining.' Photographic glass has a great future. Like so many of our products, it grew out of industrial research.

"We would like to do more of this long-range research. And we could, if we could only get more trained people. There's a great shortage of technically trained people."

The glass industry, like nearly all industries, is hunting for workers with technical ability. This means not only scientists, but men with many other kinds of precision skills. Corning, for instance, needs hundreds of technically skilled people for the precision jobs of mixing and melting glass, of shaping and cooling it, of making tools and machines for handling the glass.

The Old Art of Glassblowing

Developing ways and equipment for factory production of a new glass product is often just as big a research job as inventing the new glass in the first place.

The old way of glassmaking is the hand way. It's still the most economical way to fill a small order or to make a specially-shaped kind of ware. You can see this fascinating process in some of Corning's factories.

The "gatherer" stabs the heart of a fiery furnace with a hollow metal rod. Out comes a white-hot glowing glob of glass. The gatherer swings it like a shooting star. The "gaffer"—the master blower—takes over and blows through the tube. Slowly he breathes form and shape into the taffy-like glob.

Up to 50 years ago there was no substitute for the gaffer's lungs in shaping glass. But in 1903 Michael J. Owens, an Ohio glassmaker, perfected a machine that did what every glassblower said was impossible. It blew bottles by compressed air.

The machine age had caught up with the glass industry at last! Today machines can make almost any kind of glass except fine art crystal. At its Wellsboro, Pa., factory, Corning Glass Works has a machine that blows electric light bulbs—a thousand per minute!

We talked to one young man who has found a career making the tools and machines of the glassmaker's trade. He is 24-year-old Curtis Neuner. He had just finished his four years as an apprentice in the machine shop.

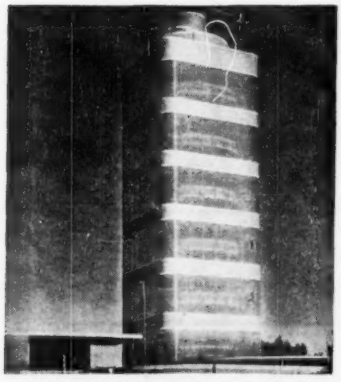
"The apprenticeship program was my big opportunity," Neuner told me.

"From the time I was 13, I worked summers in a machine shop. I had my own little shop at home. The reason I signed up to work at Corning Glass was that I was promised a chance to be an apprentice—and become a skilled machinist-toolmaker.

One Man's Apprenticeship

"I worked in the machine shop for about a year before an opening came as an apprentice. To get into the program, you have to have a high school educa-

(Continued on page 33)

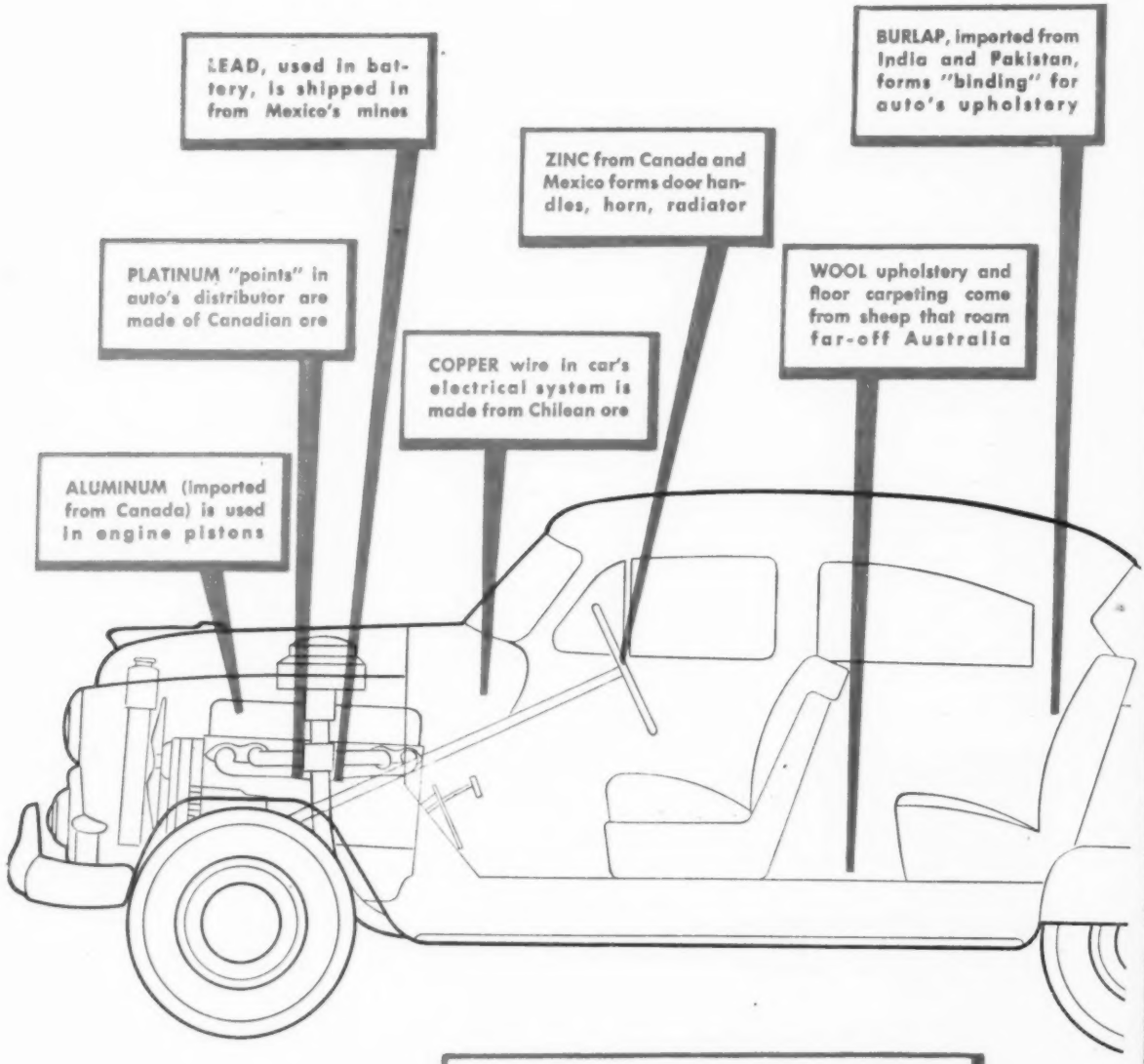


GLASS FOR BUILDING: Twenty miles of glass tubing form the walls of the new S. C. Johnson & Son research center at Racine, Wisconsin.

GLASS FOR SCIENCE: With oxygen torch to melt glass for sealing complicated parts, a "lampworker" puts finishing touches on hand-fabricated glass pump.

Your Automobile—Where It

About 300 products from 56 countries go into the American automobile.

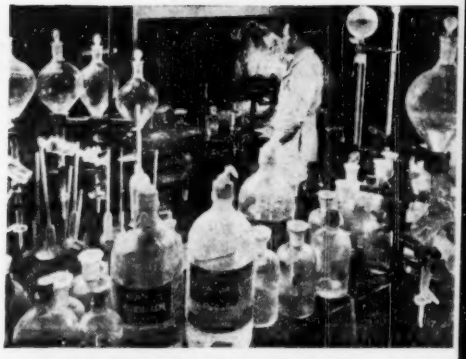

LEAD, used in battery, is shipped in from Mexico's mines
BURLAP, imported from India and Pakistan, forms "binding" for auto's upholstery
ZINC from Canada and Mexico forms door handles, horn, radiator
PLATINUM "points" in auto's distributor are made of Canadian ore
WOOL upholstery and floor carpeting come from sheep that roam far-off Australia
COPPER wire in car's electrical system is made from Chilean ore
ALUMINUM (imported from Canada) is used in engine pistons

STEEL is the major "ingredient" of your automobile. A car uses some 70 different varieties. To make them, the U. S. buys CHROME from South Africa, MANGANESE from India, NICKEL and IRON ORE from Canada

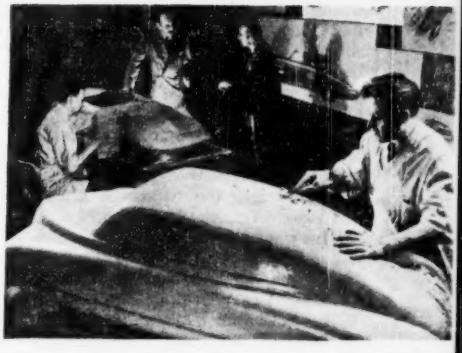
Comes From

TIN from Malaya and Bolivia goes into bearings that take the wear of moving parts
ASBESTOS from Canada lines auto's brakes
NATURAL RUBBER, bought from Malaya, goes into tires and tubes. Rubber, both natural and synthetic, is used on about 300 parts of automobile

Cutaway diagram of 1953 model Chevrolet, and photos on this page, appear by courtesy of the General Motors Corporation.



"WHY?"—science's eternal question—is asked often in the experimental labs of U. S. auto manufacturers. Here, company researchers carry on tests and studies in a continual effort to improve the American automobile. (Photo shows General Motors lab.)



NEXT YEAR'S MODEL is always up for discussion among auto-makers. Salesmen, engineers, production men, cost experts—all help work out the new design. Artists produce sketches and sculptures (in clay and wood) of designs as they're being considered.

WHEN NEW DESIGN is decided on, auto manufacturers install new machine tools needed to produce it. Orders go out to independent firms who supply parts for auto-makers to assemble. (Photo shows production line at one of the 1,000 parts plants that supply General Motors.)

THEN THE ASSEMBLY line begins rolling. Bare car frames enter on the moving platform. As they move along, workers add parts. (Here, for example, they lower auto body onto chassis.) Finished cars emerge at line's other end. The U. S. made 5,500,000 cars and trucks in 1952.

Dr. Robert E. Wilson

Your Career in Science

"THE Battle of Britain, which prevented the conquest of England by the German Air Force in 1940, was won in the laboratories of America. It was 100-octane gasoline, developed by our research workers and engineers in the ten years before the war—and shipped overseas in enormous quantities—that made it possible for the gallant British pilots, with their few hundred Spitfires, to stave off the hordes of Nazi planes. The Germans had no such gasoline. That margin of technical superiority for us and our Allies changed the course of history and saved Western civilization."

This was only one of the many fascinating sidelights on industrial research in the petroleum industry told us by Dr. Robert E. Wilson, of Chicago. Dr. Wilson is Chairman of the Board of the **Standard Oil Company of Indiana.** Because of his special interests, he also serves as chairman of the research committee of the National Association of Manufacturers.

Dr. Wilson knows whereof he speaks. He is one of the few top executives in industry who reached his present position strictly through the research field. He used to be a professor of chemical engineering at the Massachusetts Institute of Technology. Then he transferred to Standard as assistant director of research in its great Whiting refinery. In the thirty years since then he rose by steady achievement to the top position in our second largest oil company.

"Bob is going to be a good research man. He's always sure there's a better way to do everything." That's what the head of the Chemistry Department at Wooster College, Ohio, once told the young man's mother. And in the course of garnering a half dozen academic degrees, publishing scores of technical papers, taking out more than 90 patents, winning the Perkin Medal and dozens of other honors, Dr. Wilson has never stopped looking for "a better way to do things."

Standard of Indiana (along with various other companies), beginning about forty years ago, developed the "cracking" process, which is the most important advance in modern petroleum chemistry.

Petroleum consists of hundreds of *hydrocarbons* (molecules made up of hydrogen atoms in varying combinations). But as it is found in nature, petroleum doesn't contain the best hydrocarbons for certain uses nor in the proportions that are most needed.

"Cracking" Petroleum

By the methods in use in the early days of the oil industry, only 15 per cent of crude oil could be turned into gasoline. Most of it became kerosene for lamps and stoves, and much of it went to waste. But Dr. Burton of Standard Oil foresaw that the infant automobile industry would boom so tremendously that the demand for gasoline would soon exceed the available supply. By new and ever-improving processes of intense heat, better equipment, and eventually by compounds called "catalysts," they cracked crude petroleum to more than double the yield of gasoline and eliminate the "knocking" in engines.

Dr. Burton, and later Dr. Wilson and his associates, not only produced more and better gasoline, but from the by-products they made toluene (an important element of modern explosives), butylene, the principal raw material of synthetic rubber, detergents (cleansers), asphalts and road materials, 500 types of lubricating oils, and the bases of many useful plastics.

And all this time the better methods they introduced through research kept down costs. The average price of gasoline today is only 30 per cent higher than in 1926. Without cracking, gas would be a luxury product today, costing at least a dollar a gallon.

"An industrial laboratory," said Dr. Wilson, "has the job of deciding what its company should be doing five or ten years ahead. It studies the trends in invention and production processes, and tries to foresee what new methods or steps are needed. Then it sets to work to find the answers.

"At Standard of Indiana, we couldn't stay in business without top-notch technical men. Every refinery and most of the departments are headed by a chemist or engineer. We take the best technical graduates from the leading universities, and we maintain scholarships and fellowships for promising young scientists at colleges and universities we select. Starting salaries are the highest they have ever been.

"Nor are all our employees required to have advanced degrees. In every laboratory and refinery there are many technicians who came direct from high school. They are needed to do many routine tests and control jobs, to watch machine operations and keep records. If they show intelligence and responsibility, they have excellent opportunities for advancement.

"To young fellows in high school who are looking forward to technical work," said Dr. Wilson, "I would advise that you take all the chemistry, physics, and math courses you can *now*. Be sure of your aptitudes for these fields. Keep an open mind on research. Don't decide too soon between research in pure science and engineering. Some men are more interested in theory than in practice, and they are just as important as the others. In fact, industry is only beginning to wake up to the necessity for supporting basic research."

Aluminum Co. of America

This apprentice is measuring the focal distance before taking an X-ray picture of an aluminum alloy casting.

and Technology

A Survey of Research and Training Policies in Some of America's Leading Industrial Corporations

Get Science Foundation Now

At **Ansco**, which manufactures photographic equipment, research and development laboratories play a prominent part in the planning, production, and sales activities of the company.

"Progress and growth," we were told by Dr. F. W. H. Mueller, Ansco's director of research and development, "are definitely dependent on the influx of young men, new ideas, and fresh viewpoints to replace those advanced to higher levels in the expanding industry."

Dr. Mueller went on to give some advice to ambitious students in high school. "By all means," he said, "choose those courses which will broaden your background in the sciences and mathematics; but by no means neglect the arts: English, composition, history, languages, etc. For what does it profit a man to have a thought or idea if he cannot express it in a manner that others may understand?"

Similar advice to high school students was given by J. S. Leermakers, assistant director of Research Laboratories at **Eastman Kodak Company.** "In our experience," Dr. Leermakers told us, "the most valuable type of preparation for a career in industry research is one which gives the student the most extensive training in fundamental science. Another quite important asset for a scientist in industrial research is the ability to express himself clearly and concisely, both in writing and speaking.

"When in high school the student should take chemistry, physics, and biology. In college, emphasis should be on the basic courses in science. Since most industrial research laboratories find it necessary to train young scientists in their particular fields, it is better for these young men and women to have a broad background rather than specialized knowledge."

Don't Neglect the Humanities

However, the student interested primarily in research ought not to neglect the humanities. "We would also suggest," we were told by R. G. Pearson, of the **Shell Oil Company,** "that in high school and college the student take as many credits as he can in the humanities—history, literature, languages, philosophy, art, etc.—courses enabling him to understand the attitudes and forces that have shaped the world in which he lives and in which he will put his scientific training to use."

At the **B. F. Goodrich Company** research ranks in importance with production and sales. The first research laboratory in the American rubber industry was established by the B. F. Goodrich Company in 1895.

"Scientific research," Dr. Howard E. Fritz, vice-president in charge of research of Goodrich, informed us, "has been directly responsible for the development of many of the raw materials and finished articles manufactured by the company from rubber, plastics, or other chemicals."

Training for the higher technical jobs at the B. F. Goodrich Research Center should include a full college curriculum specializing in chemistry, physics or chemical engineering. "Other useful qualifications," Dr. Fritz pointed out, "are a reading knowledge of French and German and an ability to express oneself clearly in written and oral English. Desirable qualities of character are imagination, flexibility, and patience."

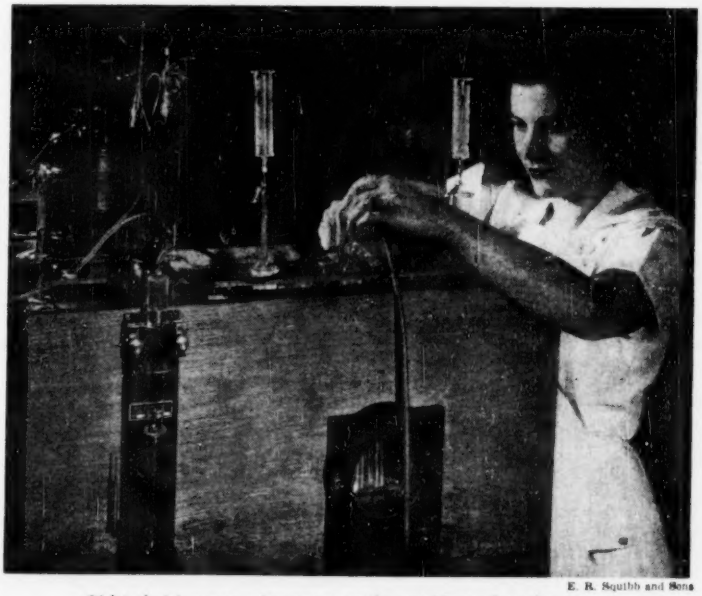
How to Select a Specialty

How should a high school student interested in a research career decide what branch of science he ought to specialize in?

"General reading on scientific accomplishments," we were told by Dr. R. P. Dinsmore, vice-president of the **Goodyear Tire & Rubber Company,** "and active development of technical hobbies are the best possible stimulants to the proper selection and the further pursuit of a scientific career."

Dr. Dinsmore added a caution, however. "No one should select a scientific career," he said, "because he thinks it is an easy way of making money. It is true that well-qualified scientists and technologists are in great demand, and probably will be more so in the future. However, one should not choose this field unless he can combine both a genuine interest with a reasonable aptitude for subjects which attract him."

To give maximum opportunity to people joining the **United States Rubber Company,** the corporation has a training program geared to the needs of each individual. "As the man grows in ability," H. E. Humphreys, Jr., pres-



E. R. Squibb and Sons

Girl technician preparing a test on the nutritive value of a protein. She uses an instrument called a Tiselius cell in a water bath.

ident and chairman of the board, told us, "opportunities for advancement open up for him. We have never been afraid to extend responsibility to younger men and women, and our management people have reached their present positions through promotion from within the company."

Mr. Humphreys pointed out that at U. S. Rubber it is not a person's particular college degree that counts. "Although a good educational background is becoming more and more essential," he said, "what is really important is the person himself, his abilities, and his sincere desire to contribute something to the company's progress."

What are the job opportunities for research scientists and engineers? One of the most serious problems at the **Bendix Aviation Corporation** is the shortage of graduate and experienced engineers and scientists. "We have requirements," L. A. Hyland, vice-president of Bendix, told us, "for several hundred engineers and scientists that we cannot fill because there simply aren't enough to go around. We want to encourage in every way possible high school graduates with technical aptitudes to continue their training and get a college degree."

Individual vs. Teamwork

Successful research is frequently the product of team work. But how about the fellow who likes to work alone—the lone wolf?

"While team or group research has come steadily to the fore," we were informed by Dr. E. W. Engstrom of the **Radio Corporation of America** laboratories, "there will always be a definite need and place at our laboratories for the scientist who is best suited for individual research. RCA gives a scientist freedom of action. After he has started an investigation he can carry it out independently."

At RCA education is regarded as a process that goes on all the time. It includes not only the work a man does to keep abreast of his field, but also study at the university. Many of RCA's research workers do graduate study for advanced degrees with the encouragement, and frequently the financial assistance, of the corporation.

Research is the lifeblood of industry. P. B. Lewis, personnel manager of **E. I. du Pont de Nemours & Company,** told us a very illuminating story that illustrates its importance.

During the depression years of the 1930's, Mr. Lewis related, when Lammot du Pont was president of the company, he noted that the research budget had been drastically pared for reasons of economy. "We must not reduce this department. It is more important to carry on research," Mr. du Pont told the research director, "than it is to pay dividends."

Research Essential to Progress

The wisdom of that statement is proved by the fact that within recent years about half of Du Pont's sales have come from products that were unknown or in their commercial infancy twenty years previously.

"It is just as certain," Mr. Lewis said, "that the contributions of research during the next generation will dwarf the marvels of the past."

Addressing himself to students in high school today, Mr. Lewis added, "They will, if enough of you who are now in school accept the challenge. Not all of you, to be sure, will or should become scientists or engineers. But you who have inquiring, creative minds; who have patience and persistence; who find satisfaction in the study of science and mathematics—you are the ones upon whom America depends to discover and develop the things which will provide better living in the days to come."

Mr. Lewis is not alone in his opinions. "Without research and development," said Walter A. Sheaffer II, president of the **Sheaffer Pen Company,** "industrial stagnation soon results." "Research work," we were told by P. C. Spencer, president of **Sinclair Oil Corporation,** "offers a challenging and rewarding field for young people. It deserves the deep consideration of all those now making their career plans." Sinclair Oil maintains fellowships in thirteen of the nation's large universities, to sponsor promising graduate students for additional studies in such fields as chemistry, chemical engineering, and geology.

But it is not only the graduate student in a university who is given opportunities to forge ahead. At the **United States Steel Corporation,** high school graduates who want to take college training can make arrangements to work in a laboratory or mill during vacation. They can work in the daytime while attending college courses in the evening.

Some courses for which college credit is given are held in U. S. Steel Corporation buildings by special arrangements with cooperating universities. In addition, the corporation has a scholarship plan. This plan makes it possible for some of its employees to attend college part time at little or no expense.

Again and again leaders in research emphasize science and mathematics.

"Young people in high school who enjoy science and mathematics," we were told by Dr. E. C. Bain, vice-president in charge of research at U. S. Steel, "should consider research and development as a career." However, in addition to the academic requirements for success, Dr. Bain stressed the importance of what he called "vast curiosity and a desire to understand and explain."

"Young people who aspire to a scientific career," Mr. Walter Sheaffer reminded us, "ought to be aware of the sometimes tedious extent of work required to gain the factual knowledge necessary for their advancement."

And there are rewards greater than simple financial ones. "There is," Dr. Bain went on to tell us, "the opportunity of being first to develop a new product or process, or the first to discover some important scientific relationship. The true research man may find satisfaction in such laudable distinctions more than in any monetary return."

General Electric Co.

Schenectady (N. Y.) high school students demonstrate the boiling point of liquids at various altitudes, guided by their physics instructor.

WHY RUN AWAY FROM MATH? Without it, you're a back number in this exciting technical era . . . it's the basic language of science and engineering . . . and it's no tougher than you think it is!

By CHESTER H. LANG

Vice-President, General Electric Company

Stick to Your Math!

LET'S face it. Unless you're an exception, you need more math.

The world today is pretty complicated. Forty years ago there weren't many scientists or engineers. Automobiles were just getting started. Airplanes were a novelty. Radio and television hadn't been born yet. Most homes had no electricity. People got their light from oil or gas. They cooked on a wood, coal, or gas stove. The scrubbing board and the muscle-powered washing machine were something to dread and kept out of sight till Monday morning.

In those days not many technical people were needed. In 1910 over a third of all employed persons were unskilled. They needed very little education. They worked mostly with their muscles, not their brains. Then that unskilled third numbered 13,400,000. Today there are but 11,500,000 of these unskilled persons, while the total number of people working has increased from 37,000,000 to 62,000,000.

Back in 1910 there were only 60,000 engineers in the whole United States—only one out of every 621 people working. But by 1950 they had increased to 400,000—one out of 139 people working.

We Need More Trained People

Yes, the world's getting more complicated all the time. This means that we have to have more and more specially trained people. We need them not only to work out the really tough problems of industrial research, like learning how to harness the power locked up in the atom. We need them not only to produce new and wonderful materials like plastics, to find ways to conquer disease, to design the machines of industry and the labor-saving gadgets of the home. We need them more and more for the ordinary things of everyday life.

It takes training nowadays to be a good carpenter, or plumber, or automobile mechanic. But those are simple compared to electronics. We used to think a radio service man had to have a pretty special kind of training, but it's much tougher for a TV service man today.

Some of you are probably saying: "That's all right if you want to be a technical man, but I want to be an artist, a druggist, a nurse, or I want to go into business for myself. What earthly good will math do me?"

Most artists today go in for applied art. They want to use their ability to draw or paint in advertising, or interior decorating, or something that will pay them a good living. But the people in business who hire the artists for that kind of work say that artistic ability is not good enough any more.

Karsh-Ottawa

CHESTER H. LANG

Before assuming his duties in 1951 as General Electric's Vice-President in Charge of Public Relations, Mr. Lang was Vice-President and General Manager of Apparatus Sales. Though no engineer himself, he has spent a large portion of his life reading engineering reports and working with engineers and executives. From his rich experience he speaks to boys and girls in the schools and colleges of America.

There are lots of boys and girls with artistic ability, but not enough of them know anything about physics or mathematics or mechanical things.

To be a druggist, you have to be a chemist. That means you have to study chemistry. And don't let anybody tell you that you can learn chemistry without knowing something about algebra.

How about a nurse? One of the required subjects in a course of nursing in a modern hospital is Materia Medica. In Materia Medica you'll learn how to figure out doses and solutions of medicines and drugs. Algebra is important in doing the figuring. Too many nurses in training flunk out nowadays because they are weak in math.

It's the same with a trade. Whether you want to be a draftsman, a machinist, a molder, or a patternmaker, you'll find that you need algebra and geometry, plus some trigonometry.

Even if you want to enter business for yourself, you'll need math. For business today, whether it's running the little gas station at the corner or the big factory down by the river, takes good management, and good management requires a mathematical mind.

But most important of all are the needs of those who are going to contribute to the wonderful progress we're making these days in science and engineering. There's a great demand for such technically trained people. They're needed in the offices and factories that turn out the things we need in peacetime and develop the new ones for tomorrow. And our military forces need them, too—badly. They are needed to pilot the planes, to operate the radar, to control gun turrets on bombers and battleships with such accuracy that even the rotation of the earth is taken into account.

There aren't enough trained people to go round. The jobs are there, waiting for them when they get out of high school or college. But not enough young people are studying the right things.

THESE OCCUPATIONS NEED

Lots of Math	*More Than Average Background in Math*	*Just a Little Math*
Architect	Accountant	Clergyman
Aeronautical Engineer	Nurse	Telephone Switchboard Operator
Research Scientist	Patternmaker	Lawyer
Marine Engineer	Teacher	Baseball Player
Ceramic Engineer	Merchant	Farmer
Surveyor	Physician	Photographer
Chemist	Machinist	Reporter
Mechanical Engineer	Draftsman	Filling Station Attendant
Electrical Engineer	Airplane Pilot	Policeman
Geologist	Commercial Artist	Fireman

Do you agree with these listings? Can you make these lists twice as long by naming other jobs?

Trouble is, they don't start early enough. That means that if you want to be an engineer or a scientist or almost any kind of specialist these days, you've got to start thinking about it now, while there's still a chance to study those subjects you need for a foundation.

And the most important of these rock-bottom subjects is mathematics.

Better Education—Better Jobs

But the fellows and girls in high school aren't getting enough math. The United States Office of Education says that only 20 per cent of all high school students are taking math. Why so few?

Perhaps you think you're not going to need math in the work you're going to do. And it's true there are still plenty of jobs open where you don't need anything but plain arithmetic—an athlete, for example, or a farmhand, or a sales clerk, or the operator of a telephone switchboard. There is still a big need for people who are merely skilled with their hands or who have strong muscles.

But if your ambition makes you dream about a more challenging job, you will need a better education. And that means math, among other things. Of course there are many other subjects you need to know to be a well-rounded person—English and history, for example, psychology and languages. They help us to enjoy our leisure, to understand and work with others, to gain a sense of values. We need to be good citizens as well as good technicians. But don't forget math!

Even if your future job requires but little arithmetic, it may be that you are the kind of person who needs mental curiosity to get the most out of life. You may be one of those people who are not content to go on living, just having an amusing time and not caring about anything else. You will be driven by your mind to find out what makes the wheels go round—what makes it rain or snow, why mirrors reflect light, or what makes TV work.

If you are that kind of person, you almost have to learn something about the more advanced branches of mathematics if you want to understand the things you are curious about. If you are curious about the distances to the sun or the moon or the stars you've got to know something about trigonometry. If you want to understand the laws that govern the workings of the universe which includes these heavenly bodies, you have to understand calculus.

Suppose your interest is in economics. That's the study of such things as inflation and banking, whether we're going to have enough food or machines to go round, and what we're going to use for money. The fellows who study economics are great ones for graphs and curves, to make statistics easy to understand. All this comes under the head of analytical geometry, a very handy subject to know.

Some people think of math as something mysterious, something that only "brains" can get good marks in. Well, if that's the way you feel about math, you're wrong.

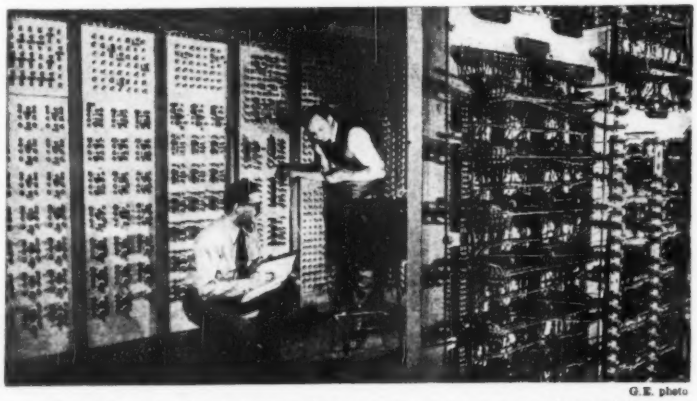
What Is Math, Anyway?

Actually—and I have checked this with some of my company's best "brains"—mathematics, no matter how advanced, no matter how strange it may seem, is just the four simple parts of arithmetic: addition, subtraction, multiplication and division. The more advanced branches of mathematics teach you how to use these four processes to solve harder problems; and they teach you how to do them *fast*.

For we use the simple kinds of math as stepping stones to reach the more complicated kinds. Once we learn addition, subtraction, multiplication, and division, it's easy to learn algebra. Once we learn algebra, it's easy to learn geometry. Logarithms are just a kind of shortcut to help solve problems in arithmetic. Algebra's another shortcut.

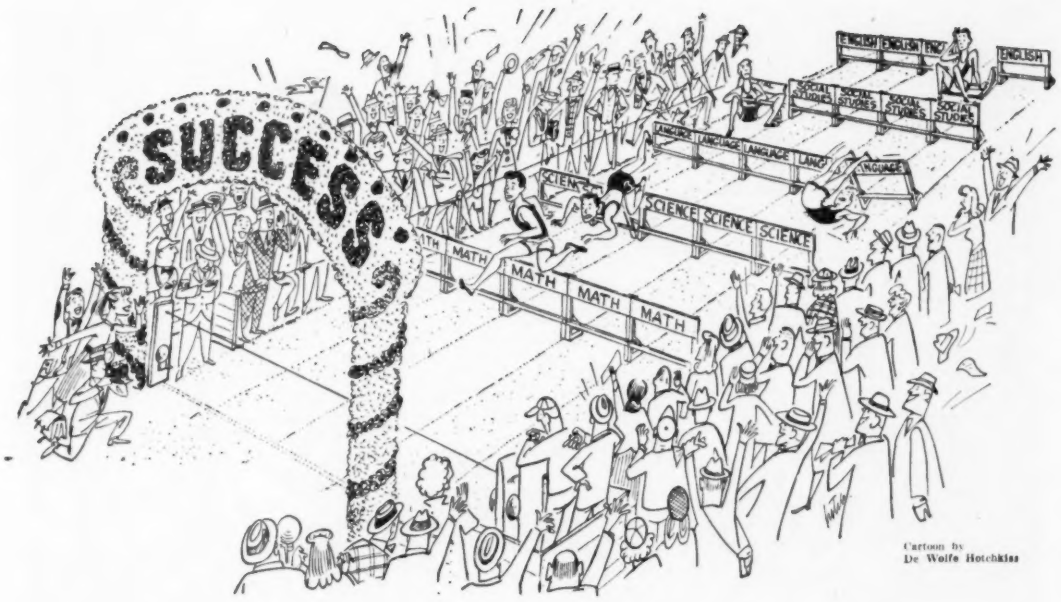
Geometry, however, isn't really mathematics at all. It's a logical study of the shapes and sizes of things. We use mathematical skill in figuring out the measurements and capacities of geometrical figures—how big they are or how much you can put into them.

Trigonometry is the next stepping stone. It uses some of the tools we learned in geometry for measuring distances. With it we can do surveying, or measure the distance from the earth to the moon, the sun, or even some



G.E. photo

This G-E electronic computer arrives at the answer to a complex problem about 5,000 times faster than a human being. But this machine is no better than the minds that designed it. Somebody has to analyze the problem and feed it into the machine before the machine can solve it.



of the stars. But when you solve a trig problem you still use arithmetic: addition, subtraction, multiplication, and division.

And calculus is a very wonderful branch of math. While geometry and trig are used to figure out problems about things that are standing still, so to speak, calculus is used to solve problems about things that are always changing—like the speed of an airplane's flight against a head wind. Yet calculus is just one more elaborate method of using addition, subtraction, multiplication, and division.

Of course, formulas and symbols scare us. That is because we don't know what they mean. But there's really nothing to be scared of. They are only simple shorthand ways of writing complicated ideas or methods of solving problems.

People who study physics have proved by experiment that if you're trying to hit a home run, it's more important to hit hard than it is to use a heavier bat. When you hit with something twice as heavy, it does twice as much good. But when you hit twice as hard, it does four times as much good. When you hit with something three times as heavy, it does three times as much good. But when you hit three times harder, it does nine times as much good.

Here is a formula: $E = \frac{MV^2}{2}$

That's what the last sixty words of the previous paragraph were trying to tell you. Translated, this formula says that Energy equals half the product of Mass times the square of the Velocity.

If you know what the letter symbols mean, and you have studied algebra, you can understand what most formulas mean.

The Most Important Part of Mathematics

When we have a problem, or something happens in a series of developments, and we have to figure out what to do next, that's called analysis.

Your arithmetic, algebra, geometry, and calculus are the *tools* you use to solve problems. But you can't use the tools unless you *analyze* your problem first to see what you've got, what you need to do, what tools to use, and how you should go about it. Analysis is the most important part of math.

For example, if you want to know what percent 48 is of 60, it's analysis that tells you to divide 48 by 60 to get the answer (80%). Analysis told you whether to use a guessing method or algebra. You solved the problem while you were analyzing it.

Professor Benjamin F. Bailey of the University of Michigan said something about that in an article he wrote not long ago. He said that education is mainly composed of learning facts, learning to get along with other people, and learning to think better. All of them are important. Now all people think, but some do a lot more of it, or do it better, than others. Professor Bailey wondered why some people thought better than others. He said the first thing necessary to be a thinker is to be born that way, like Franklin or Edison. But that doesn't mean that people can't be taught to think—or to think better. Bailey mentioned some well-educated people—Elihu Thompson, Steinmetz, Langmuir, and Coolidge. Their education, far from interfering with their ability to think, must have been a great help to their thinking ability.

Then Professor Bailey wondered what studies in school helped most in developing the habit of thinking. The first of these, he concluded, is arithmetic. Here the pupil learns to think accurately and logically—probably for the first time. Mathematics is not the only subject that helps to develop more logical thinking. You need to know many ideas in the arts and social studies that cannot be measured by arithmetic. But all scientific knowledge can be reduced to the most important tool to help us see the relations between things.

So it's to your advantage to study as much math as you can while you still have the chance. And the best time to get a good groundwork in math is while you are still in junior and senior high school. You'll find it much easier to get through college if you get a good groundwork in math now. And it will help you get a better job afterwards, too. Most important of all, it will help you to think more clearly, and to get the most out of life.

Metal of the Moon

A Radio Play on the Discovery of Aluminum

By IRVE TUNICK

ANNOUNCER: Tonight's Du Pont Cavalcade "METAL OF THE MOON" stars Montgomery Clift as Charles Martin Hall. The story begins on a September day of 1884 in the little town of Oberlin, Ohio. It was warm . . . but not hot. Down from Lake Erie, some twenty miles to the north, a wisp of wind tickled the elm trees along College Street, patted the flag of the campus of Oberlin College and, finally, meandered off rather aimlessly to the south. It was a good day for a nap. . . . Then–

(Banging of iron-ring fire alarm . . . hold . . .)

CHIEF *(shouting)*: Fire! Fire! Fire!

(Running footsteps, wheels on ground . . .)

SLOCUM: Where is it, Chief? Where's the fire?

CHIEF: The Hall House on College Street . . . young Charlie Hall must be experimenting again!

(Bell on fire-truck clangs as)

(Music: Covers quickly in and out)

CHARLIE: Golly . . . what a mess. Julia . . . Lou . . . Will you help me clean things up?

JULIA: How did the fire start, Charlie?

LOU: What happened?

CHARLIE: I don't know. I was working on a chemistry experiment. I decided I'd try . . . something different from what the book said . . . and then . . . Boom!

LOU: When Father gets home . . . that's what'll happen.

CHARLIE: What'll happen, Sis?

LOU: Just what you said: Boom!

(Music: bridge . . .)

FATHER: Charles . . .

CHARLES: Yes, Father . . .

(Giggle of girls in background)

FATHER: Arumph . . . Charles . . . May I ask you how the fire started?

CHARLES: Well . . . I don't know exactly, sir. You see, I was mixing some chemicals . . . doing an experiment . . . and . . . all of a sudden . . .

FATHER: All of a sudden . . . what?

CHARLES: Fire.

FATHER: Humph.

JULIA: It wasn't Charlie's fault, Father . . . it was just an experiment . . .

FATHER: Julia . . . you and your sisters will kindly let me handle this matter in my own fashion.

JULIA: Yes, Father.

FATHER: Now, Charles . . . your mother and I have been most indulgent in the matter of your chemical experiments. That's true . . . is it not?

CHARLES: It certainly is!

FATHER: We have maintained an attitude of quiet resignation in the face of alternating periods of abominable smells and malodorous gases. When acid dripped down from the attic . . . went through the floorboards and ultimately dug a hole in mother's favorite counterpane, we said not a word.

CHARLES: No, sir . . . not a word . . .

FATHER: You would say, then, that we . . . as parents . . . have been sympathetic?

CHARLES: Sympathetic. No question about it.

FATHER: Good. But, Charles, one has to draw a line somewhere.

CHARLES: One does, yes sir.

FATHER: Setting the house on fire . . . that is just a trifle too much.

CHARLES: I would think so.

FATHER: Good. Then you will understand exactly why I say to you at this time that you are never . . . *never* . . . *never* to conduct another chemical experiment *under this roof*!

CHARLES: But, Dad–

FATHER: There is no appeal from this decision. Good day, Charles. Good day, children.

(Music: tag . . .)

(Footsteps . . . door open and close)

JEWETT (*off mike a bit*): Well, Mr. Hall . . . Come in.

CHARLES: Good morning, Professor Jewett. I hope you don't mind my bothering you in your laboratory.

JEWETT (*on mike now*): Nonsense. Say, what's this I hear about a fire at your place?

CHARLES: One of my experiments—

JEWETT: Oh. That will happen.

CHARLES: It sure made a mess of things.

JEWETT: Sorry to hear that.

CHARLES: I've been banished.

JEWETT: Tsk-tsk . . .

CHARLES: I can't work at night any more. I got kicked out of the attic.

JEWETT: Hmmmm. Hard to work in chemistry without a laboratory.

CHARLES: It sure is. What am I going to do?

JEWETT (*after pause*): How'd you like to work here . . . in your free time?

CHARLES: Could I, sir?

JEWETT: Well, why not? All we need is the permission of the head of the Chemistry Department of the College.

CHARLES: But, Professor . . .

JEWETT: I know. I'm the head of the Chemistry Department of the College. Very well . . . permission granted!

(Music: Tag in and out)

(Sound: Laboratory noise . . . faint hum of motor in background . . .)

JEWETT: Charlie . . .

CHARLES: Yes, Professor Jewett?

JEWETT: It's stifling in here. Would you mind opening a window . . .

CHARLES: Not a bit . . .

(Footsteps . . . window open . . . little whine of wind . . . rattle of papers . . .)

JEWETT: Oh . . . watch the papers on my desk . . . (*Little scramble as they both rush to hold papers down*) Hand me that paperweight . . .

CHARLES: This it? Here you are, sir.

JEWETT: . . . Thanks. (*Pause*) What are you looking at, Charlie?

CHARLES: That paperweight. I thought it was lead. But when I picked it up . . . But it doesn't weigh anything.

JEWETT: Oh. That's not lead, my boy . . .

CHARLES: What is it?

JEWETT: That's one of the crown jewels of chemistry. Aluminum, Charlie . . . *pure aluminum*. One of chemistry's will-o'-the-wisps.

CHARLES: I've never seen *pure* aluminum before.

JEWETT: Not many people have. It's almost a laboratory curiosity. What a pity! A strong, wonderful metal . . . lighter than iron, copper, zinc or lead . . . resistant to corrosion . . . by water or air. But a baffler . . . a real puzzler, Charlie.

CHARLES: Why . . . what's so puzzling about it?

JEWETT: It's modesty, if you can call it that. This thing called aluminum is one of the most common elements in the earth's crust. Every clay bank is full of it. But you can't get it out just by issuing a polite invitation. It never occurs in its natural state . . . as pure aluminum . . . it's always bound up tightly with other elements and no one as yet has ever found a method of extracting it economically . . . getting it out in a pure state at a price low enough to make it economically feasible.

CHARLES: Can't they find anything that will reduce those compounds?

JEWETT: No, indeed. Some of the greatest chemists of the world have tried and given up . . . Charlie, here's something to think about: The man who finds a way to extract aluminum from its compounds on a commercial scale would be a benefactor to the world and . . . incidentally . . . lay up for himself a great fortune. (*Pause*) I mean that, Charlie. I'm serious.

ACKNOWLEDGMENT

This dramatic story of the discovery of the electrolytic process of aluminum reduction by Charles Martin Hall, a young Oberlin College student, in 1885, was originally presented over the air as a unit in the Du Pont "Cavalcade of America" program (NBC), on January 23, 1951. The process, later developed commercially by Capt. A. E. Hunt and George H. Clapp of Pittsburgh, was the basis of the productive power of the Aluminum Company of America.

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CHARLES: It sure is something to think about. It sure is.

(Music: In and out . . .)

(Running water and clatter of dishes)

(Door opens off mike)

CHARLES: Hiyah, Julia . . .

JULIA: Hello, Charlie . . .

CHARLES: Nobody home?

JULIA: Just me . . . and this mountain of dishes.

CHARLES: I'll give you a hand . . .

JULIA: I don't mind the dishes . . . But those big iron pots . . . I can't even lift 'em.

CHARLES: Here—I'll wash—you dry.

JULIA: I'd be crazy to say no. I yield to the gentleman from South Carolina . . .

CHARLES (*mock Southern*): Thank you, ma'am. Does this pot have to be washed?

JULIA: Unless you want to take it out in the back yard and bury it.

CHARLES: That's an idea. (*Footsteps . . . little bang of metal*) Boy, this thing must weigh 15 pounds if it weighs an ounce. Why don't they make lighter pots?

JULIA: It would be a boon to humanity. Women around the world would beat a path to the door of the man who would make a lighter pot.

CHARLES: Well, that should be an inducement.

(Pumping stops . . . swishing of water)

JULIA: By the way . . . Heard from Ellen lately?

CHARLES: Uh? From who?

JULIA: Ellen . . . Ellen Franks . . . Remember . . . the girl from Cleveland . . . the girl you couldn't stop talking about last summer.

CHARLES: Oh. No.

JULIA: Now, look here, Charlie . . . what in the world is the matter with you?

CHARLES: Why? Everything's fine.

JULIA: It is not. You're not yourself. Don't tell me . . . I know you like a book. Something's come over you lately. You're so quiet . . . and always by yourself. You don't even play the piano any more. What is it?

CHARLES: I don't know, I don't know what's the matter with me. I'm twenty-one. I'm a junior in college. I live in a plain house in an ordinary town . . . I should be just a plain, ordinary fellow. I should be thinking about girls, about sports, that sort of thing. But I don't. What's the matter with me? I've got one thing on my mind—chemistry!

JULIA: Why?

CHARLES: I don't know why. But I wake up in the morning thinking chemistry . . . all day, no matter what else I'm doing. I'm thinking out chemistry problems. At night, do I go to sleep reading a novel? No—chemistry books! Today Professor Jewett spoke about aluminum. He said that chemists have been trying for years to find some way of getting it out of its compound by some method other than reduction—which is too expensive and so no good commercially.

JULIA: Well?

CHARLES: I went to the library—got all the books I could find on the subject. It sounds crazy . . . But I intend to go after that metal.

JULIA: What's crazy about that?

CHARLES: Well, gee, I'm a student . . . and for years the best chemists in the world have been trying to find the answer. They can't . . . yet I'm going to try.

JULIA: Good. It'll take time, of course. You'll have to finish college . . . take postgrad work . . . then get into a laboratory . . .

CHARLES: I don't mean that. I mean that I'm going to try it now.

JULIA: Well, all right . . . work here . . .

CHARLES: Here? After what Father said . . .

JULIA: He said you couldn't work with chemicals under this roof.

CHARLES: He wasn't fooling either.

JULIA: What's the matter with the woodshed in back?

CHARLES: The woodshed?

JULIA: It's not under this roof . . .

CHARLES: Julia . . . you're a genius . . .

JULIA: Uh-huh. I'll leave that title for you. Come on . . . help me hang this pot over the stove . . .

(Footsteps)

CHARLES: You think I can do it, don't you, Julia?

(Sudden crash of pot to metal stove)

JULIA: Ow! Right on my foot!

CHARLES: Gee, did you hurt yourself, sis?

JULIA: It wasn't your fault, but I tell you this, Charlie Hall . . . you hurry up and find out how to get aluminum . . . and the first thing you do with it is make some lighter pots!

(Music: bridge)

FATHER: Mother!

MOTHER: Yes?

FATHER: My lemon drops aren't in the pantry.

MOTHER: Oh . . . they must be.

FATHER: They're not.

MOTHER: Let me see. *(Footsteps . . . pause)* That's funny . . . my cookie jar is gone, too.

FATHER: They were in a glass jar . . . as always . . .

MOTHER: I can't understand it. For the past few days all of my glass jars have been disappearing.

FATHER: Indeed?

MOTHER: Oh, well . . . it's nothing very important . . .

FATHER: I insist it is important. What is the world coming to when a man's lemon drops aren't safe . . . even in his own home!

(Music: tag . . .)

(Tinkle of glass)

LOUIE: Will someone please tell me what's going on in this woodshed . . . and why you need all these glass jars?

CHARLES: Is that all you two could find?

JULIA: Charlie Hall . . . there isn't a glass jar left in the house . . . I'll take an oath on that.

LOUIE: I want to know what's going on here!

CHARLES: Making a battery, Louie . . .

LOUIE: A battery . . .

CHARLES: For current . . . electric current . . .

LOUIE: Oh.

CHARLES: Julia . . . mash up some of that aluminum oxide?

JULIA: All right . . .

LOUIE: What do you want electricity for?

CHARLES: Lou, can you keep a secret?

LOUIE: Uh huh, sure. You can trust me.

FATHER *(off mike)*: Secret? And may I ask the nature of this secret?

JULIA: Father! Oh, gee!

(Footsteps in)

MOTHER: My cookie jar!

FATHER: My lemon drops!

LOUIE: My goodness!

FATHER: Charles . . . Julia . . . Lou—I think an explanation is in order.

LOUIE: I'm innocent.

CHARLES *(smiles)*: Well, Father, you said I mustn't experiment in the house—so, I'm here in the woodshed.

FATHER: I am eagerly awaiting the explanation.

CHARLES: Well, the explanation is pretty simple, Father. It's one word.

FATHER: One word?

CHARLES: Aluminum.

JULIA: It's a wonderful idea . . . it really is, Father. Look at this little paperweight Charlie got from Professor Jewett. It's pure aluminum. Feel how light it is . . . one-third the weight of steel . . . yet it's strong enough to make a bridge . . . or girders for a building . . .

FATHER: All right, but I still don't understand. Not a bit. If there's a need for aluminum, why fool around with all these glass jars, why not just mine the stuff . . . like iron or copper?

CHARLES: Can't be done. You see, aluminum never occurs in a natural state. It's always wrapped up tightly with other elements, often in complicated compounds.

FATHER: And you think you can find a way to get it out of these compounds out here in the woodshed?

CHARLES: I think so. I think I've got at least part of the answer. You see, Father, everyone else has tried to get aluminum by chemical reduction. I want to try something new . . . electricity! My idea is that a strong electrical current can break down the compounds . . . separate aluminum from all the other elements . . . get it out in a pure metallic state . . .

FATHER: Have you talked this over with anyone qualified to judge the merits of your theory, Charles?

CHARLES: Yes . . . with Professor Jewett.

FATHER: And what does he say?

CHARLES: He says I may be on the right track.

FATHER: I think I made myself clear on the matter of chemical experiments at home, Charles . . .

CHARLES: You said not under the house roof.

FATHER: So I did.

JULIA: This woodshed isn't under the house roof, Father.

FATHER: A technicality.

CHARLES: I suppose you want me to quit.

FATHER: Quit? You're not the kind that quits, Charles. No . . . I don't want you to quit . . . I want you to keep right on going. But Charles . . .

CHARLES: Yes, sir.

FATHER: I will ask you one favor.

CHARLES: Of course, sir . . .

FATHER: Will you be good enough to turn back to me the lemon drops that were in my glass jar!

(Music: Tag . . .)

ANNOUNCER *(music)*: It's a year later, 1885. Charlie Hall has graduated now and in a battered old woodshed behind his house in Oberlin, Ohio, he is still searching for the secret of aluminum.

(Sound: Crackle momentarily . . . door open off mike . . . footsteps in . . .)

JULIA: Hello.

CHARLES: Hi—sis—

JULIA: Any luck?

CHARLES *(sighs)*: Nope. I can't seem to find the right thing to get the aluminum oxide in a molten state . . .

JULIA: What next?

CHARLES: You tell me.

JULIA: The next thing is a hayride.

CHARLES: A what?

JULIA: A hayride. Come on, Charlie . . . we're all going! It'll be fun.

CHARLES: Oh, no . . .

JULIA: Charlie . . . listen . . . you've been cooped up in this woodshed for months now . . . it's bad for you.

CHARLES: I gotta get to the bottom of this.

JULIA: It's smothering you. You can't think clearly about it any more because you've been so wrapped up in everything. You need some time off . . . your brains need a vacation.

CHARLES: Well, I'd say that a hayride is a type of ambulating crucible in which various explosive chemicals react against one another.

JULIA: React or attract?

CHARLES: . . . that's a good question. All right . . . suppose we find out!

(Music: Tag into . . .)

(Hayride wagon creaking along)

(Boys and girls singing popular song of the day)

SYLVIA: Why so quiet, Charlie?

CHARLES: Nothing to say, Sylvia.

SYLVIA: I was surprised when Julia brought you along.

CHARLES: Were you?

SYLVIA: Um-hum.

CHARLES: Glad?

SYLVIA (*slightly different tone*): Um-hum.

CHARLES: I'm glad Julia brought me along, too.

(Singing in background up . . . creaking of wagon up . . . then dip again . . .)

SYLVIA: What are you thinking about, Charlie?

CHARLES: Hmmm . . . nothing 'special.

SYLVIA: You know what I'm thinking about?

CHARLES: Tell me.

SYLVIA: The moon.

CHARLES: The moon? Same old funny lookin' moon.

SYLVIA: No, it isn't. Tonight it looks different somehow. Bigger than ever . . . whiter than ever . . . just a big round rock of ice.

CHARLES: A rock of ice . . .

SYLVIA: Hmmm.

CHARLES (*suddenly alive*): Rock ice!

SYLVIA: That's what it looks like.

CHARLES: Rock ice! Sylvia . . . Thanks a lot!

(Slides off wagon . . . running footsteps . . . off mike yells) Goodbye!

SYLVIA (*alarmed*): Charlie . . . what's the matter? What is it? Charlie!

JULIA: Sylvia? What happened? What happened to Charlie?

SYLVIA: I don't know. I didn't say anything . . . I didn't do anything . . . and Charlie ran away!

(Music: Tag . . .)

(Lab noise . . . tinkle of glass, etc.)

JULIA: You should be ashamed of yourself, Charlie Hall . . . running back to the woodshed that way.

CHARLES: I'm sorry, Julia. I'll make it up to her. Get to work and mash some aluminum oxide for me, will you?

JULIA: I will not . . . until you tell me why you ran away.

CHARLES: Rock ice! That's what Sylvia said . . . and that will do the trick.

JULIA: Rock ice?

CHARLES: Ever hear of it?

JULIA: No.

CHARLES: That's what they call cryolite . . . rock ice. And cryolite is just what I need as a solvent for the aluminum oxide. Unless I miss my guess, aluminum oxide will dissolve it . . . giving me what I want—a melted mass containing no water. Now . . . I'll heat the clay crucible and you get to work on that aluminum oxide—

(Music: Tag . . . into ticking effect as of clock . . . down and out . . .)

JULIA (*yawns*): I'm tired.

CHARLES: It's late.

JULIA: It's almost an hour since we poured the mixture out of the crucible into the cooling pan . . .

CHARLES: Let's take a look. Give me the hammer.

JULIA: What should happen, Charlie?

CHARLES: Well, if things are right . . . somewhere in this cake of hardened cryolite we should find some pure metallic aluminum. Let's see . . .

(Begins to hammer)

It breaks up easily, you see.

JULIA: Do you see anything?

CHARLES: Not yet.

JULIA: What will it look like?

CHARLES: Probably . . . little buttons of aluminum . . . like little beads.

(Bangs more . . . pause . . . again . . .)

JULIA: Well?

CHARLES: Nothing.

(Hammers again)

No use. Nothing . . . not a trace of aluminum.

JULIA: Not even one little bead?

CHARLES: Nothing. (*Pause*) Well . . .

JULIA: What went wrong, Charlie?

CHARLES: Something . . .

JULIA: But everything seemed exactly right. The cryolite melted down . . . the aluminum oxide dissolved . . . maybe you didn't have enough current.

CHARLES: No . . . it's not that.

JULIA: Then what?

CHARLES: I don't know. But somewhere along the line—Let's see . . . let's go back step by step . . . First, we crushed the aluminum oxide . . . that was all right. Then we melted down the cryolite. That went all right. We put the aluminum oxide into the crucible and . . . (*Stops*) . . . the crucible!

JULIA: There was nothing wrong with the crucible, Charlie. It stood up fine . . .

CHARLES: The crucible. It was made of clay. Maybe something in that clay reacted with the aluminum and spoiled the experiment. We've got to find another type of crucible . . .

JULIA: What kind?

CHARLES: Carbon.

JULIA: Why carbon?

CHARLES: Because carbon is chemically stable. And a crucible made of carbon won't have anything in it to prevent the electric current from separating the aluminum from its compound. Come on—let's get to work.

(Music . . . again clock effect . . . slowly out . . .)

(Rooster off mike)

JULIA: What's he got to crow about?

CHARLES: More than we have . . . so far.

JULIA: Can we try now?

CHARLES: What do you think?

JULIA: I can't even think, Charlie . . . I'm afraid to think.

CHARLES: Remember the little poem we used to say when we were kids, Julia . . . when we wanted something real bad?

JULIA: Yes . . .

CHARLES: Say it.

(Starts pounding with hammer)

JULIA: I hope it's white . . . I hope it's blue
I hope that all my dreams come true . . . (*repeat*)

CHARLES: Julia . . . look!

(Pause)

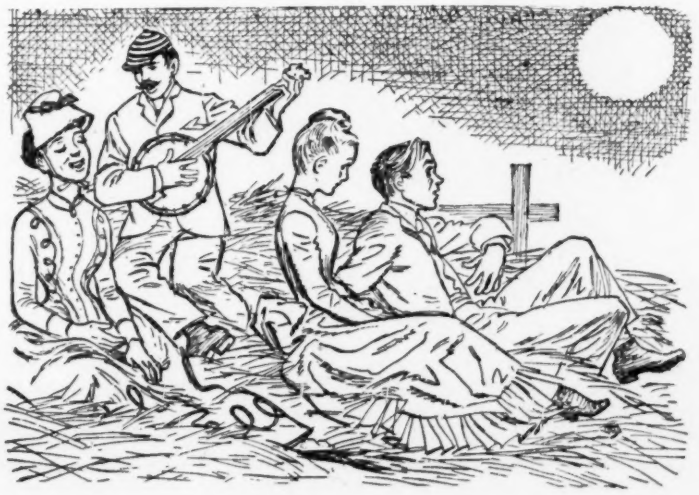
JULIA: Beads . . . a lot of beads . . .

CHARLES: Aluminum . . . pure aluminum . . .

JULIA: Like jewels . . .

CHARLES: The crown jewels, sis . . . look at them . . . the crown jewels of chemistry! Pure aluminum!

(Music: Tag . . . full . . . under . . .)



From Formula to Fiber

A Picture Story of Nylon

CHEMIST Wallace Carothers (who died in 1937) directed Du Pont experiments that led to nylon.

TECHNICIAN tests new experimental fiber on Du Pont lab equipment. To be accepted, nylon had to "pass" similar tests.

NYLON is a man-made (synthetic) fiber that was born in a chemist's laboratory only twenty years ago. How nylon grew is one of the most amazing "success stories" of U. S. industrial research.

It all began in 1928, when the Du Pont Company told a team of its research chemists: "As you know, nature builds the big 'fiber' type of molecule (such as those of cotton and silk) by linking smaller molecules together in long chains. Find out all you can about this process."

The chemists set to work. By 1930, they had learned enough to begin making new types of "long-chain" molecules themselves. In 1935, they came up with nylon—a chain of more than 100 molecules of hexamethylene diamine and adipic acid. (These are chemical substances produced from air, water, coal, and oil.)

(In the photo at the top of the page, you see the beginnings of the man-made fiber, nylon—in the test-tube of a research chemist.)

Nylon fiber, the chemists found, was strong, elastic, light in weight. Also, it "wore like iron."

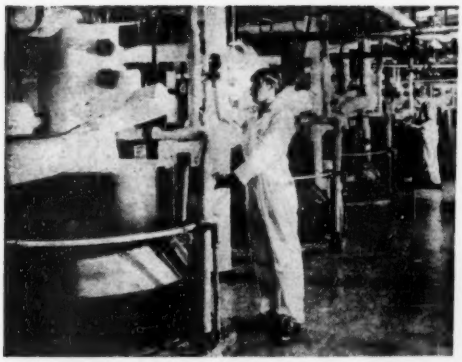
The next question was: "Could nylon be mass-produced as yarn for making textiles?" After four more years, the labors of 250 researchers in thousands of experiments, and the spending of millions of dollars, Du Pont came up with the answer: "Yes!"

Du Pont swung into commercial production of nylon in 1939. Nylon won success as a textile for women's stockings. Other uses followed. The "test-tube miracle" grew to be one of the leading textile fibers in the world.

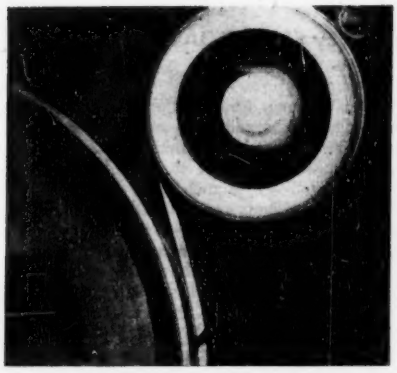
Since nylon's birth, chemists have created a whole new family of synthetic fibers. You've seen their names in the textile ads—orlon, dacron, dynel, acrilan, vicara, etc. Today, about one fourth of the fibers we Americans use are of the man-made type.

Our world has more than 90 chemical elements. Only the tiniest fraction of their possible combinations has been tested for commercial use. Researchers of U. S. chemical companies are hard at work, seeking new materials, new products for a higher standard of living.

(The photos on these two pages, furnished by courtesy of the E. I. du Pont de Nemours Company, Inc., show how nylon began and how it is manufactured today.)



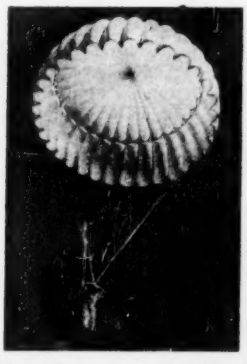
BOILED: In giant "pressure cooker," called *autoclave*, small molecules are heated until they link up in long chains, forming the big molecules of nylon.

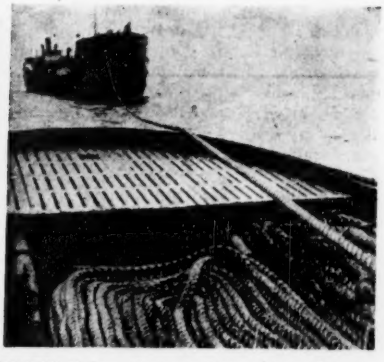


WHIRLED: Nylon pours from "cooker" *(upper left)* onto whirling wheels, solidifies into ribbon, and is again liquefied.

SQUEEZED: Liquid nylon squeezes through tiny holes of *spinneret*, hardens into tiny filaments as soon as it strikes the air.

SPUN: Filaments run through rollers, are spun into nylon yarn. Yarn is stretched (making it elastic), then shipped to nylon users in industry.





USES OF nylon are many and varied. It's fashioned into WOMEN'S STOCKINGS—and stoutly-woven PARACHUTES and MARINE ROPES! Nylon also goes into shirts, dresses, underwear, carpets, upholstery, fish nets, tennis rackets.

Green Clouds Against the Wind

Gene knew a way to keep the mountain from sliding—and he knew it would work

By JESSE STUART

A YOUNG man wearing tight-fitting dungarees, brogan shoes, and a red sweatshirt under his leather jacket, took long strides across the wooden bridge over Town Branch. His shoes made such clopping sounds that a man standing a hundred yards away turned to look. The man was wearing boots, khaki pants and shirt, a sport coat, and a tan hat. He watched the youth as he came onto the highway from Tanyard Hollow. He was swinging his long arms with a book in each hand, as if they were weights at the ends of swinging pendulums that gave him more momentum to push forward against the morning wind. The youth was bareheaded and his hair was slicked back. His cheeks were red as ripe wild plums, for the February morning wind had whipped color into his face.

"Good morning," said the youth.

The man stood with a pad in one hand and a pencil in the other. He was looking up the steep slope in front of him.

"Good morning," the man answered gruffly as he turned to the youth standing beside him. "It's not a good morning. But I guess that's the way we'll greet each other. Not a good morning for the State Highway Department, anyway! This whole mountain is sliding into the road!"

"I see it is," said the youth. "But that could have been stopped some time ago if the highway workers had used their heads!"

"Used their heads," the man repeated. "How could they use their heads to stop a mountain from sliding into the road? I happen to know a little bit about this sort of thing! It's my job! I'm an engineer for the State Department of Highways."

"Then you do know a lot about roads," the youth replied. "But last October when I was possum hunting up there on Coon's Point among the persimmons, pawpaws, and beeches, I saw big cracks in the ground. Many of the cracks were waist deep. I fell into one to my waist. I knew then the hill was breaking and something should be done!"

"Why didn't you do something?" asked the engineer.

"I did tell the boss of a road crew in this county he ought to do something, that Coon's Point was coming into the road," he replied. "He only laughed at me!"

"Then tell me how this hill could have been kept from slipping last October," said the engineer.

"The big beech trees should have been cut," the youth said.

"Why?"

"The beech trees have big tops," replied the youth, "and when the winds blow hard, their big tops stand as a barrier against the wind. The strong winds push against the heavy tops and that shakes the trees down to the bottoms of their foundations. This causes the earth to crack around their roots. Not so deep at first. But the October winds are heavy up there on Coon's Point. Then the November rains start falling and the water runs into the deep cracks and softens the ground. Then, the November winds come again and shake them on weaker foundations. During the winter freezes they hold pretty well until February, when the ground thaws and the February winds start. All the earth, I figure, by this time is loose down to the rocks. And this is what starts the slides. I'm not surprised at that one. I've been expecting it!"

"Who told you this theory you have about slides?"

"I got to thinking about it the first night I went up there possum hunting," he replied. "I wondered what had made the cracks. I figured it out for myself. And I believe I'm right!"

The two men stopped talking. They looked up the steep slope where the giant beech trees leaned in crazy confusion. The steep slope, almost to the high backbone of Coon's Point, was like giant stair steps. The first break was above the road. This break had come down and covered the highway with twenty feet of soil and shale rocks. The slide had carried trees with it. And if the second slide behind pushed down, it threatened to push the first one over into Town Branch and dam the creek. If this happened, the creek would flood the houses up the valley. When one slide was removed, there was another behind it to come into its place. There were six giant breaks up the slope ready to slide down.

"I've seen a lot of slides in my day," said the engineer. "This is the worst I ever saw. Look at it, won't you!"

"I'm looking at it," said the youth. "Right up there at the sixth place, up nearly to the top of the hill, is where I fell into the break. I fell in up to my waist. My arms caught on each side and I lost my lantern in that place. I suppose it went on down to the rocks!

I had to get out of there and carry my dog on one of the darkest nights I ever saw."

"Say you possum hunt?"

"Yes, sir, I do," replied the young man. "That's the way I buy my clothes. I hunt and trap and sell the pelts. I buy my clothes, high school books, lunch, and school supplies by hunting and trapping. Last November I sold eighty-six dollars worth of pelts."

"That's very interesting," said the engineer, as he turned to the youth again. "Can't your father help you?"

"No, not my father," the youth replied. "He does well to take care of himself. My grandpa and grandma have raised me. I've been with them since I was nine years old!"

"Since we've talked this long we might as well know each other's names," said the engineer. "My name is Bill Porter."

"My name is Gene Darby," said the high school student.

THE two men shook hands. The engineer smiled for the first time.

"Tell me about yourself, Gene," Bill Porter said. "What do you plan to do when you finish high school?"

"Go to college," Gene replied. "I'm going to college if I can find a way."

"What do you plan to study?" Bill Porter asked.

"I've not decided exactly," Gene told him. "I can't make up my mind whether to study agriculture or forestry. And I'd like to be a forest ranger too! I love days and nights in the woods."

"Do you hunt at night by yourself?"

"Yes, sir."

"You told me awhile ago how you would have prevented this mountain from slipping down, Gene," Bill Porter said, grinning. "Now tell me what you would do if you were in my place. See, I studied engineering. I wish sometimes that I'd studied forestry and lived among trees. And I would much prefer to be a ranger and work in some big state park to having a problem like this. Wouldn't you?"

"I don't know," Gene smiled. "I know what I'd do if this was my problem!"

"See, we've got to do something in a hurry," Bill Porter said. "Heavy machinery is on the way here now from Auckland to remove this slide. All traffic is cut off and rerouted by the way of Simington, to Big River and then to Greenwood. People living in this valley have to drive seventeen miles to get to Greenwood. It's hurting the merchants in Greenwood. We've got to remove this slide in a hurry. The pressure is on us. Now tell me what you'd do!"

"If you take this slide out, the other will come down," Gene said thoughtfully. "It will slide into the place you take this dirt from. And when you remove the next one, another will slide down from the hill! And you'll be working here all spring and summer until you move this side of the mountain. You've got to stop the slides! And you'll never do it until you cut the trees. Cut the tall trees where the winds shake their tops and let them lie on the ground where they fall! I wouldn't cut the small ones. I'd let them grow and their roots will help hold the soil."

"Gene, I'm glad to get your opinion," said the engineer. "Now, I'll tell you my plans!"

Gene looked strangely at the engineer.

"You are a thinking young man," said Bill Porter, "but there are scientific ways to handle this. We'll remove the slide. We'll try to open the road today for one-way traffic. Tomorrow, we'll have it opened for two-way traffic. Then, we'll put the dozers up on the hill and make a terrace to catch the next slip! We won't bother to cut all the timber up over those breaks to the top of the mountain. That would be like cutting a tract of timber. So, by terracing it we can save the trees!"

"I'm afraid you can't save the trees," Gene said, shaking his head. "Look at 'em now. They're falling and sprawling all over each other. They need to be cut down! I don't know what you mean by terracing."

"That's taking off the top half of the second slide," Bill Porter explained.

"But what will you do about the bottom half?" Gene asked.

"Leave it," Bill Porter told him.

"The wind will still shake the beech tops and their roots will shake the earth when the heavy spring rains come," Gene told him. "Coon's Point will keep on sliding into the road."

"We'll see how it works out, Gene," Bill Porter said.

"I'll be seeing it from day to day, since I walk this way to school," Gene told him. "I must be on my way now."

"I'll see you later, Gene," said Bill Porter. "Goodbye."

"Goodbye," Gene said.

Gene climbed over the slide and down the road. Bill Porter watched him when he turned to look back at the big slide. He watched Gene's face turn up the hill, as he looked Coon's Point over. Then the youth turned and hurried down the road.

The following morning when Gene was on his way to school, he saw a sign on the other side of the bridge: *Slow Down. One Way Traffic.* Cars were going through one at a time. The road was clogged with heavy machintry—three bulldozers, two steam shovels, and a long line of dump trucks. Highway workers as well as machinery had been brought in from other counties in this emergency to open this highway.

That afternoon when Gene Darby walked back from school, the one-way sign had been removed. There were two lanes of traffic moving over the road. The engineer, Bill Porter, had told him what they would do and they were working according to schedule. Gene stopped and watched the bulldozers bite deep into the second slide. He watched steamshovels loading the dump trucks. There was a line of trucks moving slowly away with heaped-up loads of earth.

Gene didn't see the engineer. But he did see what Bill Porter meant when he told him he would terrace the second slide. They were biting deep into this mountain with heavy machinery and leaving a great space on the second slide. The third slide, if and when it came down, they thought would stop on the terrace. While Gene stood looking at the terrace, a man with a shovel walked over to him.

"Are you Gene Darby?" the man asked.

"Yes, sir, I am," Gene replied.

"Mr. Porter was telling us about you," said the highway worker. He grinned curiously as he looked Gene over. "Said you gave him some advice on this hill."

"But he asked me for it," Gene answered quickly.

"Did you know, young man, that you were talking to an engineer in the State Department of Highways?" the man asked.

"Yes, I did," Gene replied. He wondered what Mr. Porter, who had asked him for advice, had said about him to this man. He even asked me to tell him about myself, Gene thought as he stood there looking at the man who had to hold his laughter. "Go on and laugh at me," Gene shouted. "You're about to!"

GENE turned and walked up the road and he heard the man laughing. The laughter behind him was explosive. Other men laughed. Gene Darby didn't smile now. He hurried up the road and his brogan shoes clopped over the wooden bridge.

They're laughing at me, he thought. I'll never open my mouth again to tell men on the highway how I'd do something. They're engineers. They ought to know how to fix a slide. I guess I'm wrong. I didn't mean to be a smart-aleck. That's what they think I am. But I've helped Grandpa saw down the trees and leave them where they fell when the winds in autumn started shaking them and breaking the road. The banks didn't slide down into Grandpa's joltwagon road either. But Grandpa didn't go to college. Grandpa

Powderjay can't even read and write his name. But I saw it work. The hills stopped sliding. We'll wait and see. But I hope I never see Bill Porter again. He's talked about me. The workers wouldn't know about me if he hadn't.

Gene continued along the five-mile shortcut he traveled morning and night to school.

The following morning when Gene went to school, he didn't stop to look at the terrace, which was deeper down into the second slide. That afternoon as he walked back from school, the terrace had been finished. The machinery had been moved out and the men were gone. The road had been opened for two lanes of traffic. And he stopped now and looked at the terrace. About half of the second slide had been removed and the dirt trucked away. That looks good, Gene thought as he stood there, a smile on his face and a book in each hand. Then he looked upon the steep slope on the third stair step and there were the large beech trees with their giant bushy tops entangled. Not one of these trees had been cut.

In early March the winds began to roar over the country. It was as hard a wind as Gene Darby had ever heard blow. In the three fireplaces in his Grandpa Powderjay's house, the wind came down and blew soot over his Grandma Powderjay's white window curtains. The roar of the wind was like the sound of boxcars on a crooked winding mountain railroad. Gene had never heard anything like this wind around his home. It was a warm wind for March. And the next morning when Gene got up, the rain was falling as hard as he'd ever seen it.

"You're not goin' to school this mornin' are you, Gene?" said Grandmother. "You don't have a hat and a raincoat."

"I'm not missin' a day, Grandma," he said. "I've never been tardy since I've been in high school."

HE put his books under his leather jacket and bareheaded walked away in the downpour of March rain. When he crossed the bridge over Town Branch, the water was up level with the floor of the bridge. When he walked down the highway, he stopped to stare. The bottom half of the second slide, where the terrace had been made, was over the road and another slide had moved down. This was a bigger slide than the first. And the giant trees had come down with it. There was an older man, in a long raincoat and hat, looking the road over. Gene didn't stop to talk to him. Dirt was still sliding into Town Branch, damming the stream, and the rain was coming down.

That day the rain stopped and the heavy machinery moved in. State Route 1 was blocked again and the traffic had to be rerouted. For two weeks, bulldozers and steamshovels were in action and there was a continual stream of dump trucks moving in opposite directions hauling away dirt. It took them one week to open the road for two lanes of traffic. The second week, they made another terrace and drove piling at its base to hold back another avalanche from Coon's Point. But they didn't cut the giant forest of beeches on stair steps four, five, and six.

And there were more heavy winds in March and great downpours of rain. Before the month was over it happened again. Stair step four had moved down, breaking the piling as if it had been made of toothpicks. The wooden piling was buried under the great avalanche that blocked the highway. Gene Darby saw the heavy machinery and road trucks return for the third time. This time it was early April. And he saw another engineer. His hair was white beneath his hat and he had two younger men with him. Gene thought the engineer was nearly as old as his Grandpa Powderjay.

The road crews this time spent most of April working to stop these slides. First they opened the highway for traffic. Then they cut another terrace and used piling at the base. Then the big surprise came. Gene Darby saw men climbing over the rugged slope sawing down the giant beeches. When he saw this he stood in the highway with a broad grin on his face. He watched the men cut down the trees and leave them where they lay. Many of the trees fell into the giant cracks in the earth. Others fell across the cracks to tie the sides, as shoe laces hold two sides of a shoe and give each side strength. They didn't cut the persimmons and pawpaws where the possums found food in autumn. They were not tall enough or their heavy tops big enough to stand as barriers against the wind in spring. Gene Darby was happy now. I'll tell Grandpa this afternoon when I get home what they're doing, he thought. Grandpa will be pleased.

There were heavy rains in May. But there weren't any slides. Gene Darby walked past Coon's Point morning and afternoon on his way to and from high school. Each time he passed, he looked for fresh breaks on that rugged slope. The giant beech trees were cut now. They were not standing with their heavy green tops of foliage as green clouds against the wind.

After Gene had finished his third year of high school, he continued to pass Coon's Point on his way to and from Blakesburg. June, July, August, he saw Coon's Point two or three times a week. These months brought heavy rains and some winds that shook the low green persimmon and pawpaw bushes and the massive sheets of sawbriar and greenbriar that hid the deep scars on this high hill.

September came and brought the turning of the leaf. Gene Darby began his senior year in Greenwood High School.

ONE day in October an old man came to the Greenwood High School. "I'm looking for a young man named Gene Darby," he told Superintendent Torrence.

"Yes, I'll get him for you," Superintendent Torrence said. "I suppose you're his Grandfather Powderjay."

"No, sir, I'm an engineer for the State Highway Department," he said. "My name is Fred Belcher!"

"I'm glad to know you, Mr. Belcher," Superintendent Torrence said. "I'll have Gene here in just a minute."

Superintendent Torrence phoned Gene's room. In a minute the tall youth walked in.

"I'm Fred Belcher, Gene Darby," said the old man as he shook Gene's hand. "I'm the third engineer the State had on the Coon's Point slides. I was told that you suggested to Mr. Porter last February, when he had the first slide, that he ought to cut the trees. And you gave him your reasons. Is that right?"

"Yes, sir," Gene said, while Superintendent Torrence listened.

"I've heard you walk five miles to and from school," Fred Belcher said. "You got a lot of horsesense from somewhere, young man! I've just checked Coon's Point. You and I together have stopped the slides!"

Gene's face beamed with happiness.

"Our State Highway Department is offering a scholarship for a young man wanting to be an engineer," he said. "This will pay your expenses four years at the State University. You're a senior this year and I understand will finish your high school education. We have agreed on you as our choice for this scholarship."

Gene Darby tried to speak. The words wouldn't come! There was a smile on his face and the tears ran down his cheeks. I'd like to run all the way home and tell Grandpa, flashed through his excited brain. I saw Grandpa do it. It's Grandpa's horsesense, he thought as he looked at the old engineer and tried to thank him. What will Grandpa and Grandma think when I tell 'em tonight that I'm not going to study agriculture or forestry at college and that I won't be a forest ranger after all?

RESEARCH

Builder of America

Builder of jobs

Builder of tomorrow

All over America, research is stepping up its pace. To those engaged in it, it is the most exciting work in the world. Each knows that the little light he sees today may be a star in tomorrow's sky.

It begins quietly with a scientist in his laboratory . . . a technician at his bench. Few hear of what they are doing as they plug away.

Then, suddenly, there comes an invention that changes a way of living . . . that creates new industries and new careers . . . that binds this country together even as it helps it grow.

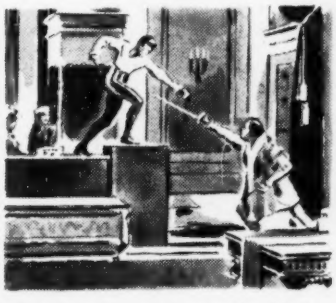
Many of these developments have come out of telephone research. Today, in 90 seconds on the average, you can reach any telephone in 70,000 communities in America. Did this just happen? What things had to be discovered first?

You'll find quick, exciting answers to these questions in this picture story.

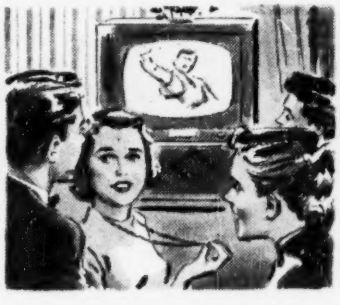
Is this a rocket to the moon?

No – it's one of America's anti-aircraft guided missiles taking off. Launched, steered and exploded by electronic controls, the missile blasts into enemy aircraft at supersonic speed. This is one of the most dramatic products of American research. The electronic devices that launch and control the missile were produced by telephone scientists working with the Douglas Aircraft Company, which developed the missile itself. Bell Telephone men had been working with electronics for telephone purposes. When the country called on them in an emergency, they put their knowledge to defense use.

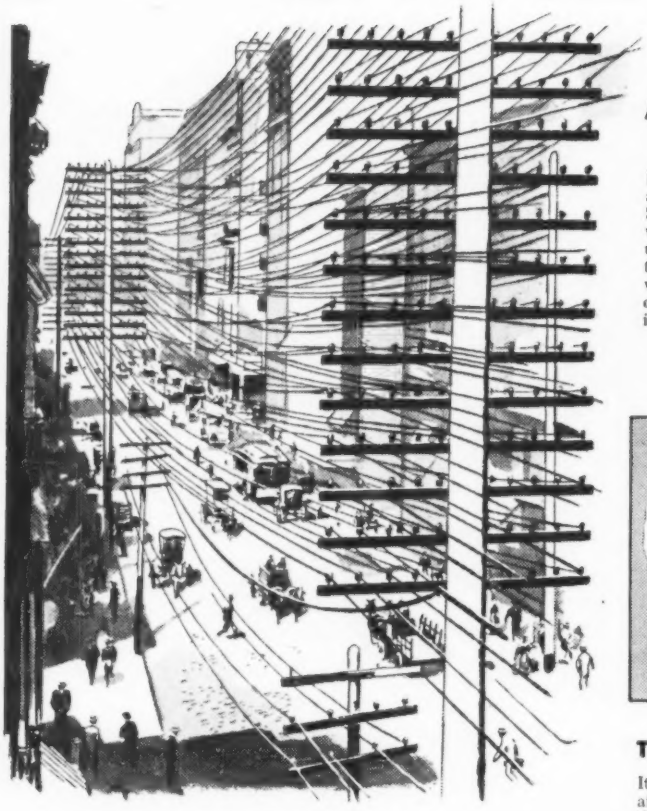
Is he talking by wire, air or pipe? The telephone company will speed his voice home to Mother by any or all of these channels, when he uses *today's* telephone. Long Distance calls may go part of the way by wire or cable . . . leap into the air over the new Radio-Relay microwave system . . . or use the small pipes in a coaxial cable. (Radio-Relay and coaxial are described on the following pages.)



Did movies always talk? No, the old timers were silent. Then Bell System scientists developed the equipment that made sound movies practical. In the picture illustrated above—John Barrymore in *Don Juan* – music was first synchronized with action on film. That was in 1928. A year later came the first full-length movie with speech—Al Jolson in *The Jazz Singer*.

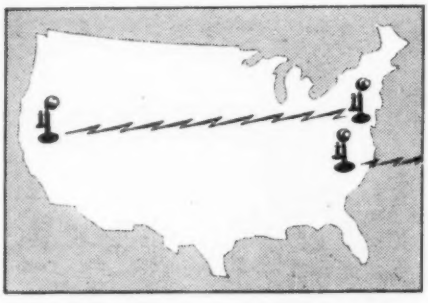


How does a television show reach your home? It travels over the telephone system part of the way. In fact, in a coast-to-coast network broadcast, both television and radio use special telephone lines 99% of the way from studio or stadium to you. The same research that led to modern telephone service provided channels for our great entertainment and information networks.



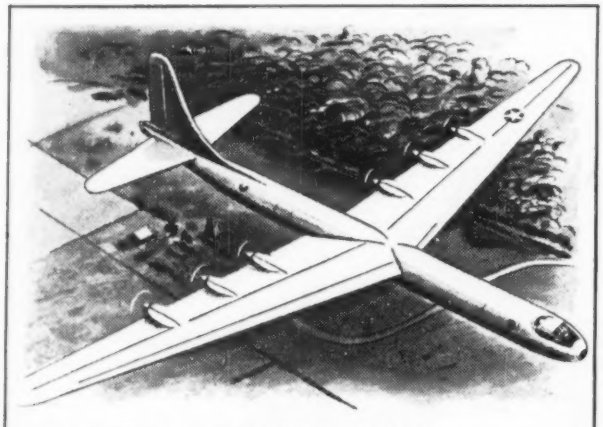
Ask Granddad
if he remembers this

It's Broadway, New York City, in the 1880's—shortly after Alexander Graham Bell invented the telephone. So many people wanted telephones that there simply wasn't room for all the wires. Could they be buried underground, in cables? No, said some; voices couldn't travel that way. But Bell System research came up with a new kind of cable. It replaced many thousands of miles of overhead wires . . . made it possible to interconnect millions of telephones.



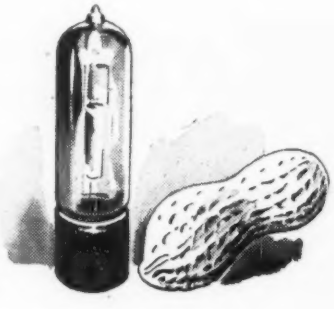
Talking across America

It happened for the first time in 1915—three years after research men at Bell Telephone Laboratories developed the first practical amplifying vacuum tube. Tubes in "repeater stations" boosted voices as they sped from New York to San Francisco with the speed of light. Other tubes helped send conversations across the Atlantic for the first time, from Arlington, Va., to Paris. Thus, research linked Americans together—and with the world overseas.



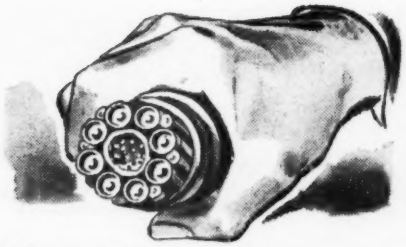
Research pays off for the U.S.A.

Radar bombing systems for America's airplanes are important examples of the way research helps the country in emergency as well as in peace. The research branch of the telephone system alone is working on more than 100 defense assignments. They include atomic weapon developments and other top secret work. Bell scientists have already produced fire control equipment for anti-aircraft guns, improved radar, and a new field telephone for the Army.



"No bigger than a peanut"

That's what they said when the vacuum tube shown above was produced. (Scientists still speak of it as the "peanut tube.") Because it saved space and drew less current, it could be much more widely used. One of the main jobs of research is often to make things smaller, handier and less expensive, as well as better.

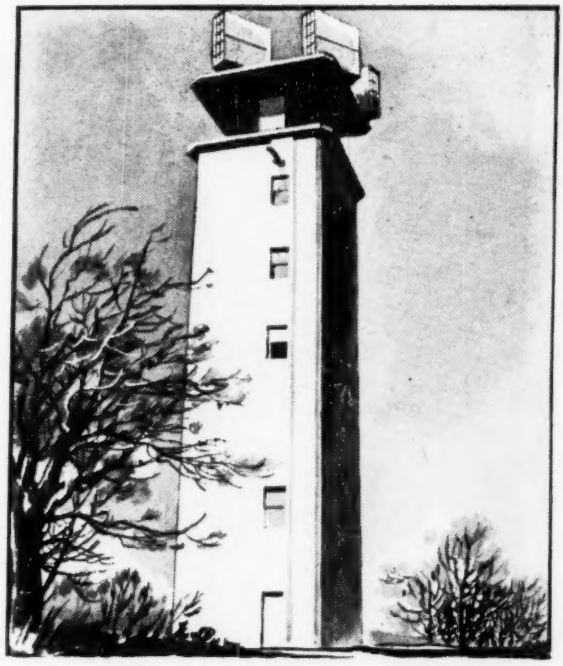


1800 at a time

Once, only one conversation could travel over a pair of telephone wires. But more and more Americans wanted to talk. So "carrier telephony" came into being—using currents of different frequencies to carry several telephone messages on a single pair of wires. Then, in 1929, Bell scientists invented the famous coaxial cable, shown above. In coaxial, electrical voice vibrations travel through narrow pipes buried in the earth. Each coaxial pipe can carry as many as 1800 telephone voices at once—or 600 voices *plus* a good, clear television program.

A voice highway through the air

Coaxial gave the nation another communications link, but research men looked ahead and saw that still more channels would be needed. In 1947 they introduced Radio-Relay transmission of telephone voices and television. In Radio-Relay, metal lenses focus radio microwaves as a glass lens focuses light rays. Voices and network television ride the beams across the country. Because microwave beams won't bend and follow the earth's curve, Radio-Relay lenses must be mounted on towers or in stations high in the mountains. Then the messages are relayed from one to the other. It takes 107 stations to span America from the East to West Coasts.



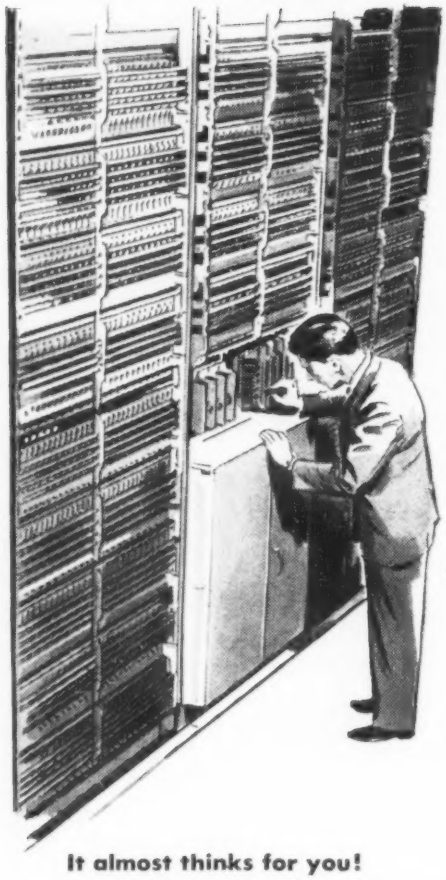
Mighty mite with giant muscles

Here is one of the latest products of research in America. It is called a ***Transistor*** and was invented by the Bell Telephone Laboratories. No bigger than a pea, the ***Transistor*** can do many things a vacuum tube can do—and more. For example, it can amplify voices 100,000 times, using only a *millionth* of the power of the smallest tube. The ***Transistor*** has no glass, no vacuum, no filament. It consists of a wafer of a metal called *germanium*, connected to three hair-thin wires. ***Transistors*** may revolutionize the whole world of electronics—in television and radio sets . . . "electronic brain" computing machines . . . radar and secret defense equipment.

"Hello . . . I'm calling from the car!"

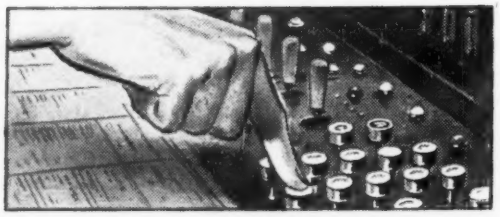
This mobile telephone, mounted right in an automobile, is one of many that have been produced by the Bell Telephone System for special uses. Other special installations let us talk from trains, airplanes, and ships far out at sea.

TURN PAGE
FOR MORE ABOUT RESEARCH



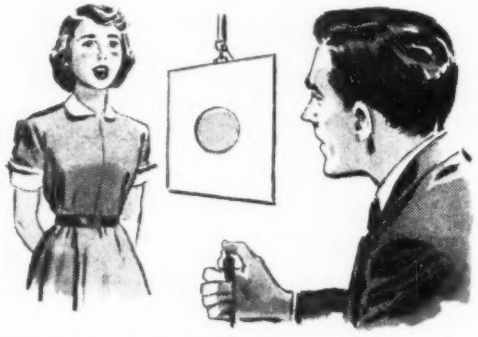
It almost thinks for you!

You've heard a lot about "electronic thinking machines." Here's one of them—an automatic telephone switching mechanism which goes to work when you dial a number. It takes the number you want, remembers it, finds the fastest way to get it, and even seeks an alternate route if one is busy—all in a matter of seconds.



What will tomorrow's telephone be like?

Here's just one indication. The fingers of that Long Distance operator are "dialing" a number—perhaps thousands of miles away. Some day every telephone subscriber may be able to reach any telephone in the country simply by dialing a number. Right now, 10,000 subscribers in Englewood, N. J., are making daily use of the first customer Long Distance dialing equipment. Still another future possibility is that you may some day just speak a number into the telephone and get the person you want automatically. And telephony is just *one* field where American research is working to make things easier and faster for all of us.



Research works with *people*, too

Most of us think of research as being connected with mechanical and chemical things. But today's scientists are interested in those things particularly as they relate to what *people* want. Then they set about to provide it. Here, a young girl's voice is being tested—one of a long series of studies designed to make the telephone still easier and pleasanter to use. Tomorrow's telephone will be built around things that people want. So will all the other advances science is getting ready for America even now.

What does this mean to *you* as you think of your future?

In the telephone business there are many different kinds of careers. Few businesses today offer such chances for varied and satisfying work in a public service, linking together the lives and activities of people, as the Bell System does. In each day's operations, telephone companies need men and women of various educational backgrounds and skills—craftsmen, operators, engineers, typists, clerks, scientists, sales and contact representatives, outdoor and indoor workers.

Each job opens the door to a fine future, with a high degree of job stability and security. There are many chances for promotion, in an interesting and constructive field that means much to our country. If you would be interested in finding out more about these opportunities, ask your school guidance counselor or inquire at your own telephone company office.

BELL TELEPHONE SYSTEM

Science Makes Your Future

(Continued from page 6)

poor example of what I preach. Down South I played in the school band, debated, and joined the track squad. When I got a scholarship to Duke, I thought I was going into the textile business, like my father. But I had a chance to transfer to M.I.T., and I've been here ever since.

"I'm not a specialist in any one scientific field. But I got mixed up in journalism, became managing editor of *The Technology Review*, the alumni magazine, and from there was asked to become executive assistant to the president, Dr. Karl T. Compton."

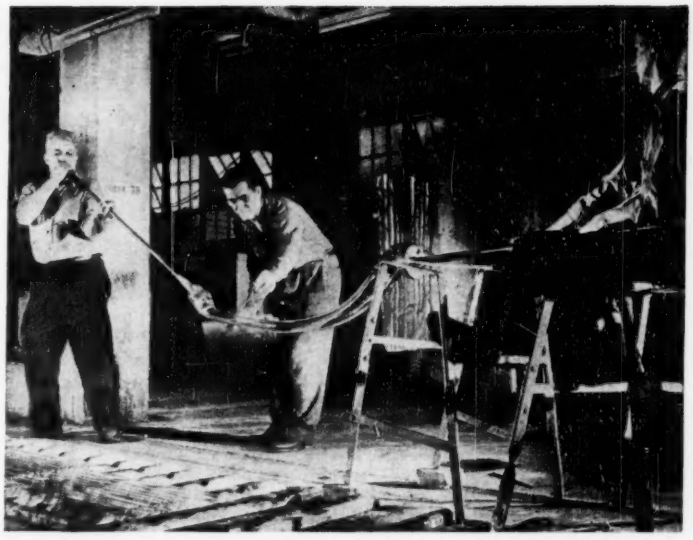
Perhaps we'd better spare Dr. Killian's modesty the rest of the way. When Dr. Compton, the distinguished physicist, was called to Washington for essential work in defense research during World II, he chose Jim Killian, then only 39 years old, to be executive vice-president of M.I.T. Five years later, in 1948, Killian was recommended by Compton to succeed him as president. So Dr. Killian came into technology through the back door of technical journalism and administration.

"When you talk about Big Business these days," explained Dr. Killian, "you really mean Big Technology. The men who run our great corporations are increasingly finding it essential to have technical training. Look at Fairless of U. S. Steel, Sloan and Wilson of General Motors (now Secretary of Defense), Greenewalt of Du Pont, Craig of American Telephone, Abrams of Standard Oil of New Jersey, and Wilson of Standard Oil of Indiana. All of them are engineering or science graduates, and we are proud that some of them came from M. I. T.

"America spends three billion dollars a year on scientific research—$20 for every man, woman, and child in the country. More than half of this—about 55 per cent—is paid for by the Government today. That's because of our enormous stake in defense industry and atomic energy. Of the rest, 40 per cent is supported by private industry, and only 5 per cent by universities and other non-profit institutions.

"But, as defense spending tapers off in the next few years, I confidently expect the percentage of private industry's support of research to rise to where it was ten years ago. Business has the greatest need for basic scientific knowledge, because it cannot successfully compete without it.

"So, to any young person—boy or girl—who looks forward to a life of both service and prestige, I sincerely say: 'Look to science. It will make your future.'"



This glass will become thermometers. Gaffer (left) slowly backs up, blowing to keep bore open inside the hot, taffy-like glass. Man in center checks diameter.

Glass Houses

(Continued from page 11)

tion, or the equivalent. You have to have a good record on the job. You have to pass aptitude tests, too.

"During my four years I put in over 8,000 hours' work in the machine shop. I got a chance to work in all parts of the shop. I also went to classes four hours a week. I studied mathematics, metallurgy, physics, economics, and other subjects that helped prepare me for a career at Corning."

At his "graduation" as an apprentice, Neuner received a state certificate showing that he was now a "journeyman." This rating indicated that he is a skilled toolmaker-machinist. It meant an automatic rise in pay.

And if he does a good job in the next couple of years, he will be considered for advanced training in designing of tools and machinery. This training will give him the rating of junior design engineer. He'll have a chance to move on to a supervisor's job.

There are other avenues to opportunity in the glass industry. Glass factories need many young people for beginners' jobs.

The boy just out of high school usually starts as a helper on a job where he is paid by the hour. He can work into more skilled jobs, such as operating a machine or a glass melting tank. One way he can get ahead to more responsible positions is to sign up for the "general training" program. Those who pass the necessary tests and interviews are admitted to evening classes on their own time. They study the company's organization and products and the problems of supervising others. From "general training" graduates, CGW picks many of its men for supervisory positions.

For girls, there are clerical and stenographic jobs. Business training teachers in the local high schools visit Corning Glass Works to learn what kinds of jobs are opening up. On Saturdays, when CGW's business departments aren't working, business classes get a chance to come to the factory to look over and operate the various business machines.

If you are aiming at a scientific job, of course, you'll need additional training beyond high school. CGW hires dozens of college-trained people every year for technical and administrative jobs.

Arthur Brintnall, assistant director of industrial relations, says:

"In picking people for specialized jobs we give about equal weight to these three factors: 1, scholarship; 2, aptitude, as shown by tests which we give; and 3, our judgment of a person's possibilities as a leader. We judge this on the basis of interviews and of his record in school. We believe that the best indication of a man's leadership later in life is what he's done up to the time we see him.

"The course a student takes in high school isn't terribly important to us. We believe we can give him the specialized training on the job. We're more interested in the kind of record he makes—in whatever course he takes—and the leadership he shows and the way he works with people."

Understanding the NEWS

Malenkov Takes Over Stalin's "Red Empire"

Russia and its "Red empire" are under new management.

Joseph Vissarionovich Stalin, who ruled over 800,000,000 subjects, is dead *(see last week's news pages)*. His place has been taken by Georgi Maximilianovich Malenkov. The name is pronounced gee-OR-gee (with "hard" g's, as in "Magee") Max-e-meel-YAN-o-veech mal-lyen-KOV.

THE OLD LEADER

Last week Stalin was laid to rest in the Mausoleum on Moscow's Red Square. He lies beside his predecessor, Vladimir Lenin, the first dictator of Soviet Russia. Their bodies, preserved by secret methods, remain on public display—and Russians are taught to revere them as supermen of communism.

During the night of March 1-2, Soviet leaders announced, Stalin suffered a brain hemorrhage. He died March 5, at the age of 73. Ten physicians and top government and Communist party officials signed the death certificate.

Stalin's real name is Dzhugashvili. Before the Communists came to power in Russia, they were illegal revolutionaries, hunted by the police. Many of them used nicknames instead of their real names. The nickname "Stalin" means "steel" in Russian. The alias of one of his co-conspirators, "Molotov," means "the hammer."

For 29 years, Stalin ruled Russia with an iron fist. The son of a poor Georgian shoemaker, he became one of the world's most powerful men. Like Ivan the Terrible, like Peter the Great, he was a ruthless despot—and a builder of Russia. Stalin was a minor figure in the Bolshevik Revolution of 1917, in which a small group of Communists seized the Russian government. After Lenin died in 1924, Stalin and two others became a three-man committee of leaders. One by one Stalin eliminated his political rivals. By 1928 Stalin was the undisputed dictator of Soviet Russia.

During his "reign," the government took control of farming. Millions of peasants who resisted were killed or banished to slave labor camps. Russia was also rapidly industrialized under Stalin, and today ranks as the second mightiest industrial power in the world.

In 1936-38, thousands of top Soviet officials were—at Stalin's order—accused of "treason" and executed. Tens of thousands of others were jailed. According to reports made to the U. N., over 10,000,000 persons are still in Soviet concentration camps.

In 1939 Stalin signed a pact with Hitler, dictator of Nazi Germany. This freed Hitler of worries over possible war with Russia and he attacked his neighbors. Two and a half years later, in the midst of World War II, the Nazis broke the pact and invaded Russia. To help Russia fight back, the United States in three years provided the Soviet government with $11,000,000,000 worth of military aid through the lend-lease program.

When the war was over, Stalin turned against his allies. He brought huge areas under his control as Russian "satellite states," and waged "cold war" against the Western nations.

THE NEW LEADER

Within 24 hours after Stalin's death, a new leader took over. Neither the 200,000,000 people in Soviet Russia, nor the rest of the 800,000,000 people in the Soviet "empire," were consulted. The choice was made by a handful of Communist party politicians.

Malenkov, Stalin's successor as premier of the Soviet Union, is 51, moon-faced (*see photo*), short (5 ft. 7 in.), and fat (250 lbs.). Malenkov is described as merciless and humorless, but also as competent. He has been characterized as having a "card-index mind." He never forgets figures or faces.

What's Malenkov's background? Unlike Lenin and Stalin, he was not a Communist in the illegal, "underground" days of the party in Russia. He was only a boy at the time of the Bolshevik Revolution. His whole adult life has been lived under Communist rule.

He was born in the Ural Mountain region. At 17, Malenkov joined the Red Army, and a year later he became a member of the Communist party. Then he was sent to Moscow to study at the Higher Technical School for administrators.

In 1925 Malenkov became one of Stalin's personal secretaries.

Malenkov's work was largely with the Communist party organization. Thus he was in position to control the distribution of various government posts. This made it possible for him to build up a strong personal following in the party.

When Stalin became premier—the top position in the Soviet Union government—Malenkov took over most of Stalin's work as party boss. Now, stepping into Stalin's shoes as premier, Malenkov is also keeping his job as top man in the Communist party machinery.

Under the Soviet system, the Communist party really runs the government. No other political party is permitted. The Communist party picks government officials, from the top level down to the smallest village.

Malenkov is said to be a tough taskmaster. He has banished many an inefficient Soviet executive to Siberia.

He has never been outside the Soviet-dominated realm, and he has never given an interview to a correspondent from a Western nation.

In his public speeches, Malenkov has spoken out against the Western powers, and has bitterly denounced the United States.

At Stalin's funeral, he pledged his government to work for peace and higher living standards. (Russian leaders often call for "peace"—by which they seem to mean victory over the Western democracies, and submission to Communist orders.)

"NEW ADMINISTRATION"

Lavrenti P. Beria, 54, a deputy premier, for many years minister of state security (secret police), now becomes also minister of internal affairs.

Vyacheslav M. Molotov, 63, a deputy premier, resumes the post of foreign minister, which he had held from 1939 to 1949. He replaces Andrei Y. Vishinsky, who is named chief Soviet

Sovfoto

United Press photo

RUSSIA CHANGES BOSSES: Georgi Malenkov, Russia's new premier, is at extreme left. Photo, taken at Moscow's May Day parade in 1949, shows Malenkov in the place of honor at the right of Stalin, Russia's leader from 1924 until his death this month. The No. 2 man in power, ranking next after Malenkov, is believed to be Lavrenti P. Beria (third from left), head of the secret police. No. 3 man is probably Vyacheslav Molotov (extreme right), who replaces Andrei Vishinsky as foreign minister.

U. N. delegate. Vishinsky, who hurried home to Russia after Stalin's death, was temporarily replaced at the current U. N. Assembly session in New York by Andrei Gromyko, Russian ambassador to Britain. He was formerly Russia's U. N. chief delegate.

Marshal Nikolai A. Bulganin, 57, a deputy premier, who was a sort of "political overlord" of the armed forces, is appointed minister of war.

Beria, Molotov, Bulganin, and Malenkov are the new "Big Four" of Soviet Russia.

Another change is the designation of Marshal Klementi Voroshilov, 72, as the chairman of the Presidium of the Supreme Soviet (parliament). You might translate that as "president of the Soviet Union." It is a "decorative" post with no real power.

WHAT'S AHEAD?

Will the "Big Four" stick together, or will they begin squabbling among themselves? After Lenin's death, the Communist party was torn by the strife between the "Big Two" of that time—Trotsky and Stalin. The struggle lasted for several years. In the end, Stalin came out on top. But Russia was on the verge of civil war.

So far, the new "Big Four" presents a united front to the outside world. How long this "unity" will last is anyone's guess.

THE SATELLITES

If a struggle for power develops in the Kremlin, the Soviet empire may begin to crumble at its edges—in the satellite states. Any sign of weakness in Moscow may tempt some of the satellites to desert the Soviet camp, as Marshal Tito, Red dictator of Yugoslavia, did in 1948.

How about the Chinese Communist chieftain, Mao Tse-tung? He has regarded himself as second only to Stalin. In his first statement after Stalin's death, he pledged loyalty to Russia. But as a leader of the world Communist movement, will he be willing to play "second fiddle" to the "young upstart" Malenkov?

U. S. POLICY

As far the "cold war" is concerned, most observers do not anticipate any great change in the Soviet program.

Western government officials, including our own, have seemingly adopted a "wait and see" policy. The free world is not relaxing its defenses.

Secretary of State John Foster Dulles told a press conference that our Government saw no reason for any particular change in U. S. policy as a result of Stalin's death.

"As Stalin dies," said Mr. Dulles, "General Eisenhower, the man who liberated Western Europe, has become President of our great republic, with a prestige unmatched in history. A new era begins, one in which the guiding spirit is liberty, not enslavement, and when human relations will be those of fraternity, not one-man domination."

"America Votes" Award

The American Heritage Foundation has acclaimed Scholastic Magazines for our contribution to better citizenship through our 1952 pre-election special issue, AMERICA VOTES.

Out of more than 15,000 entries, AMERICA VOTES received the Foundation's award for "the most effective special issue of a magazine in support of the [Foundation's] National Non-Partisan Register and Vote Campaign." Chairman of the awards committee is Charles E. Wilson, former president of General Electric Company and former defense mobilizer.

AMERICA VOTES was Part 2 of the October 1, 1952, issue of the various Scholastic magazines.

The Foundation's awards to counties, cities, and states with outstanding "get out the vote" records were listed in last week's news pages of *Senior Scholastic*.

Hiding from the Atom

Atomic bombs have been set off in the past to help science or to help the army—but this week's atom test is intended to help *you and me*.

An atomic weapon mounted on a tower in the Nevada desert was scheduled to be exploded March 17. Officials are loosing the terrible blast against many of the articles you use every day. From these tests they hope to learn how to advise you to protect yourself in an atomic warfare danger zone.

The Civil Defense Administration built, and completely furnished, two two-story wooden houses. They were much like millions of other American homes—except that each had its own private bomb shelter in the basement. One of the houses was built a half-mile from the center of the explosion. The other stood three miles away. The Government wanted to

see what would happen to the houses and their contents when the blast went off. For example, would furnishings be dashed into the bomb shelter?

A hundred automobiles—some used cars, some brand-new—were parked at different distances from the center of the blast. The cars faced in different directions. Some had full gas tanks, some had half-full tanks, some had no gas. Windows were rolled up in some, down in others.

In each car there was a dummy—a shopwindow mannequin. Some dummies were dressed in winter clothes, some in summer clothes. Some were on the floor of cars; some were sitting at the wheel; some were lying in car seats.

Civil defense officials from every state were invited to the tests. Maryland Civil Defense officials picked Mrs. William F. Melville, Sr., 51, as one of their delegates. She was chosen as typical of average citizens who volunteer for civil defense work in their home areas.

Squeeze on Red China

Great Britain plans to help the United States put a new squeeze on Communist China.

Britain agreed to cut down on shipment to Red China of "strategic materials"—that is, materials useful for war. These include not only guns and ammunition, but metals, fuels, and other goods for war industries.

The agreement was announced in Washington, D. C., after conferences between British and U. S. officials.

The British agreed to forbid ships owned by Britons or flying the British flag from hauling war-useful goods to China. Furthermore, ships bound for Red China with strategic materials won't be able to get fuel at any port in the British Commonwealth of Nations.

What's Behind It: Non-Communist countries shipped more than $300,000,000 worth of material into Communist Chinese ports last year. More than 700 ships registered in free world nations called last year at Hong Kong—a British colony which trades largely with Red China—and at Red Chinese ports.

In addition, the Chinese got more than 250 shiploads of goods from the Soviet Union and Red satellite countries. U. S. Navy officials estimate that 40 per cent of China's imports for war come in by sea. The rest come overland—by railroad, caravan and highway—mostly from Russia.

Science Talent Institute photo

SCIENCE TALENT Search winner for 1953 is E. Alan Phillips, 15, of Lincoln, Mass., a student at Weston High School at Weston, Mass. He received the $2,800 Westinghouse Grand Science Scholarship for studies (involving complicated mathematics) on whether the earth would stay together if it were made of water. Phillips is shown with an electrical generator which he made.

Not all the goods carried by free world vessels into China were on the list of "strategic materials"—although the goods may be used in war industries. Western European nations shipped in chemicals; Ceylon and Indonesia sent rubber; India sent jute; Pakistan and Egypt sent cotton.

Many of the countries whose ships trade in Chinese ports are fighting with United Nations forces against the Chinese Reds in the Korean war. The United States wants to stop this "trading with the enemy."

In 1951 the United Nations General Assembly urged halting of strategic materials shipments to Red China. As a result, 65 nations agreed to cut down their shipments. The United States and Canada have banned all exports to Red China.

A majority of the ships which have carried goods to China have been British or British Commonwealth vessels.

Will the new agreement weaken Red China's war machine? Will France, Italy, Greece, the Scandinavian countries, and other free world nations join Britain in clamping down on the Chinese trade? Can trade with China be stopped without use of warships to blockade Chinese ports?

THE NEWS IN BRIEF

PLANE "INCIDENT": The U. S. Government strongly protested to Czechoslovakia over the shooting down of a U. S. Air Force plane in the U. S. zone of Germany March 10. The attacking planes were two Russian-made MIG jet fighters which came from Czechoslovakia, 15 miles away, the Air Force said. The U. S. pilot bailed out safely.

ON THE SHELF: Congress has decided not to act—at least, not right now—on one of President Eisenhower's proposals. He asked Congress to pass a resolution denouncing Russia for breaking postwar agreements. Some Republicans wanted to go farther than the President, and add a hint that they disapprove of the Yalta agreement made by the late President Roosevelt *(see March 4 news pages)*. Democrats balked. So the whole proposal was "pigeonholed."

VINCENT RETIRES: John Carter Vincent is leaving the diplomatic service. Senate investigators in 1950 and 1952 accused him of disloyalty *(see Jan. 7 news pages)*. This month Secretary of State John Foster Dulles overruled the Civil Service Loyalty Review Board, which had found "reasonable doubt" of Vincent's loyalty. But Dulles added that Vincent's performance of duty had fallen short of standards required "at this critical time." The Secretary accepted Vincent's resignation. He will receive an annual pension of $8,100. Vincent had recently been serving as U. S. Minister to Morocco and diplomatic agent at Tangier, North Africa.

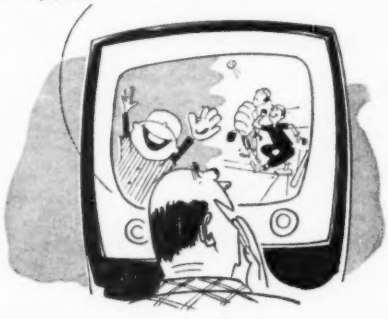
Quick Quiz ON THE NEWS

What do you know about Russia? Its population is about _____ million, and altogether there are about _____ million people under Russian domination. Russia ranks in _____ place among the world's industrial nations. The Communists got control of Russia in _____. The first dictator, Vladimir _____, was succeeded by Joseph _____, and he in turn by Georgi _____.

HAVE YOU HEARD?

DON'T THROW YOUR FUZZY OLD RECORDS AWAY!

Those scratchy records, too bad to play, too hot to toss out, can be made to sound "young" again. You disc fans will be happy to know General Electric engineers have come up with a new Record Compensator that helps cut the surface noise from old 78 rpm shellac records. The device has a five-position variable control for "hi-fi" tones.



TWO PICTURES ON ONE TV SCREEN

TV viewer's dream comes true: how to follow the action in two places at one time. New G-E portable pickup system does jobs formerly almost impossible except in the studio. Look for electronically controlled split pictures on your set this season!

SOUNDLESS SOUND LAUNDERS GREASY OBJECTS

Soaking greasy parts in liquid solvent to de-gunk them is done in lots of factories, but G-E engineers hit on an improvement. Sound waves—too high to hear—now speed the job of the solvent. Laboratory engineering in the field of *ultrasonics* is making new gains for industry.

You can put your confidence in—

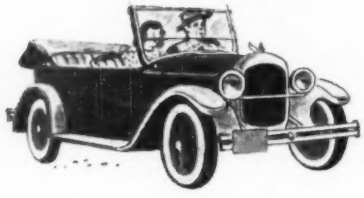
GENERAL ELECTRIC

GREAT MOMENTS

IN THE HISTORY OF CHRYSLER-BUILT CARS

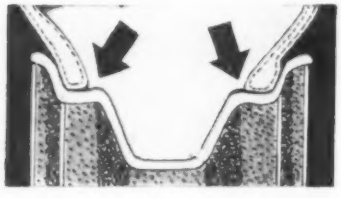
1923 ALL-STEEL BODIES

The first all-steel safety bodies for enclosed passenger cars heralded a radical departure in automobile body building. With the first all-steel bodies introduced by the Dodge Division, wood body parts including those previously used for structural reinforcement were eliminated altogether. Despite the skepticism of the rest of the industry, customers soon discovered that the new all-steel bodies were safer and stronger in every way, were finer in appearance and easier to maintain. The enthusiasm of the driving public for these significant advantages eventually forced the entire industry to follow.



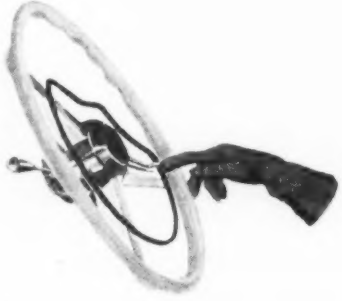
1924 FOUR-WHEEL HYDRAULIC BRAKES

Walter P. Chrysler and his engineers realized that stopping power had not kept pace with going power in the still young automobile industry. The introduction of four-wheel hydraulic brakes for passenger cars, like many other automotive developments of the time, was an engineering gamble. But it was a gamble that paid off to become one of the basic advancements in automobile progress. Customers quickly recognized the increased safety value of this remarkable means of bringing the car to a swift, sure stop. They wanted it, and four-wheel hydraulic brakes became universal on American automobiles.



1940 SAFETY-RIM WHEELS

Particularly noteworthy among the many advancements in driving safety introduced by Chrysler Corporation are Safety-Rim Wheels, which made their first appearance in 1940 and have equipped all Chrysler-built cars since. Developed for protection in case of a blowout, Safety-Rim Wheels have special retaining humps designed into the inner rims to hold a deflated tire and tube on the wheel until the car can be brought to a safer, straighter, controlled stop. Safety-Rim Wheels are just one of the long list of safety "firsts" by Chrysler, engineered for greater protection of the driver and passengers.



1951 POWER STEERING

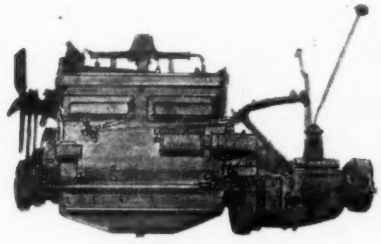
Power steering, offered first by Chrysler in 1951, established entirely new standards of automobile driving ease, comfort and safety. Engineered to perform 80 per cent of the steering work automatically, this revolutionary full-time power steering mechanism instantly supplies hydraulic power assistance during all driving and parking conditions whenever the steering wheel is turned. Full-time Chrysler Power Steering reduces driver fatigue during turning and parking, makes ordinary "straight ahead" driving easier and safer by resisting ruts and chuck holes, and provides quicker, surer control on wet or icy roads.

CHRYSLER

The story behind some of the famous "firsts" in automobile progress—

part of the long and growing list of advancements pioneered by Chrysler Corporation.

The first Chrysler "Six" of 1924 was a spontaneous sensation as a newcomer in an already crowded field. Willing to stake their future on a belief they could produce a better automobile, Walter Chrysler and his associates completely engineered the first Chrysler from start to finish. Over the years, Chrysler Corporation has steadily advanced its reputation for engineering good things first. Today, a staff of more than 3000 engineers is constantly adding to this growing parade of outstanding new developments in the automobile industry.

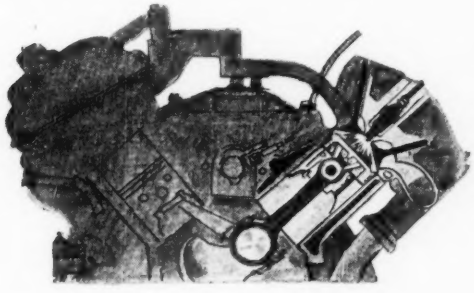


1928 HIGH COMPRESSION ENGINE

Chrysler engineers introduced the first modern high compression automobile engine in 1928 and called it the Chrysler "Red Head." From a standard compression ratio of only 4.6-to-1, the Red Head stepped up to 6.2-to-1, making possible more effective use of improved higher-octane gasolines, and producing greater engine efficiency and more economical performance than had ever been known. The 6.2-to-1 ratio pioneered by Chrysler Corporation in the Red Head was so far advanced in its day that it was not for ten years afterward that the rest of the industry was able to make it a standard.

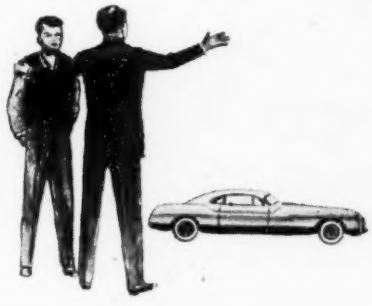
1931 FLOATING POWER ENGINE MOUNTINGS

Greater driving comfort, as well as increased safety and performance, was a constant aim of Chrysler engineers in the early days, just as it is today. Climaxing years of research, Chrysler was able to introduce in 1931 an advanced method of supporting the automobile engine in perfect balance on rubber mountings bonded to steel. Now vibration impulses originating in the engine could not be transmitted through the body of the car by metal-to-metal contact. This development, called "Floating Power," had far-reaching effect in reducing driving fatigue and increasing the comfortable ride of Chrysler Corporation cars.



1951 HEMISPHERICAL COMBUSTION CHAMBER ENGINES

Increased effectiveness of the modern automobile depends more on increased efficiency than on higher speeds. Toward this end, Chrysler engineers developed and perfected an advanced designed automobile engine with the famous Hemispherical Combustion Chamber. Formerly used only on aircraft engines and in a few racing and sport cars, this engine design was adapted by Chrysler engineers for the first time to quantity production for passenger cars. Designed to deliver far greater efficiency on either regular or premium fuel, the hemispherical head engine is probably the most spectacular of all the Chrysler engineering "firsts."



WHAT NEXT?

Chrysler engineering does not stop here, but works on in ever-expanding fields, improving the fine cars of today and searching for other remarkable developments. At Chrysler Corporation, the opportunity for fresh ideas and new talents never diminishes. There is a real challenge here . . . beckoning to young men and women with thorough educational backgrounds in mathematics and the sciences. Young people with imagination, daring and resourcefulness can find a richly rewarding career . . . working side by side with other engineers of Chrysler Corporation, helping to bring about the miracles of tomorrow.

CORPORATION PLYMOUTH • DODGE • DE SOTO • CHRYSLER

NEA Service, Inc.

"I'm afraid my father is about to go bankrupt. I've earned so much baby-sitting I'm no longer a dependent!"

BOY dates GIRL

by Gay Head

HURRAH—you've landed a part-time job! Maybe you're most pleased because you won't have to ask Dad to advance your allowance any more, maybe because there'll be something to write in the "previous experience" blank on your application for a full-time job when you've finished school, or maybe because you'll be able to start a savings account to help you through college. Whatever it means to you, you're proud of having landed your part-time job and you're determined to make the most of it.

But you know that finding the job was only the first step. Now it's up to you to put your best foot forward and make your debut in the working world a successful one. So here are a few pointers to help you get into the swing of things:

Q. I've just accepted a part-time job in an office, and I'd like to know what kind of clothes to wear to work. Would school clothes be all right? Or should I dress the way I do for a date?

A. Since time spent working in an office can't be compared with either a school session or an evening on the town, neither school clothes nor date clothes would be exactly right. Every office has its own standard of what is good taste in the way of clothes, and you'll soon become familiar with any special customs in your company. But, until then, you won't go wrong if you remember that, in general, a well-groomed office worker dresses neatly and conservatively. Your clothing should be clean and uncluttered—something that makes you look sensible and efficient. Here are some suggestions—and warnings—for both boys and girls.

Girls. You're properly dressed for the office if you're wearing:

1. A clean, pressed blouse and skirt, a tailored suit, or a tailored dress, with the hemline about mid-calf length. (Beware of spots or stains; too-tight dresses; sagging hemlines; a slip showing; shoulder straps askew under sheer blouses; safety pins instead of buttons or needed stitches.)

2. Shoes with medium-height heels—highly polished, if leather; brushed daily, if suede—and medium-sheer stockings with *straight seams.* (Steer clear of spike heels; ankle straps; run-down "loafers" or ballet slippers; fancy sheer stockings or bobby sox.)

3. Very simple and very little jewelry, clean gloves, and a neat serviceable handbag. And, although the workers in some offices don't make a general practice of wearing hats, it's safer for you to start out by appearing in one. Wearing a hat (if it's small and not too fancy) never makes a bad impression, but showing up without one in a hat-wearing office does. When you've sized up the situation in your office, you can leave a hat that's not needed at home—later. (Avoid dangling bracelets and large earrings. They not only irritate others, but they get in your way. And dressy handbags, as well as flashy jewelry, look unbusinesslike in an office.)

Of course you already know that you should be clean from top to toe, that your hair is combed neatly, that your nails are manicured, that your make-up is natural-looking, and that your posture is impeccable!

Boys. You're properly dressed for the office if you're wearing:

1. A clean, well-pressed suit with accessories in a pleasing color combination, such as: a brown suit with a tan shirt and a green or yellow tie; a gray suit with blue and maroon; a navy blue suit with light blue and red. A clean, white shirt is always in good taste. And well-polished shoes are a "must." (Beware of spots on ties; baggy trousers; mixed plaids, stripes, and pattern-design materials; lumberjackets; sweatshirts; turtleneck sweaters; "loud" shirts. And don't take off your coat and roll up your shirt sleeves in the office unless your co-workers take life that casually!)

Naturally, you stand and sit straight, your hair is neat, your handkerchief and socks are fresh daily, and your fingernails are clean and trimmed.

All clear? Now if you work as well as you look, you'll be doing fine!

Q. I'm about to start working nights as a baby sitter. The job itself doesn't bother me because I've "sat" so often with my own kid brother, but of course things are different when you're in somebody else's home. For instance, is it all right for a sitter to use the phone, radio and TV set—if there is one? What about raiding the ice-box when hungry? And would it be okay to invite a date in for company when the child's asleep?

A. Most parents will be glad to let you use their radio, TV set, and telephone (for local calls!) while you're "sitting" with their youngsters, but you should ask their permission before they leave, anyway. It's not only the polite thing to do, but also it gives them a chance to tell you about other possible *do's* and *don'ts* for the evening. "Knowing the ropes" makes any job easier and it eliminates the chance of a bad blunder when you're left alone.

Find out about the refrigerator question beforehand, too. If your charge's mother doesn't ask you to help yourself, don't take that privilege for granted. If you do, and there isn't enough milk left for baby's breakfast the next morning, you might find yourself minus a customer in the future! So, to be safe, check ahead of time. And if you know you'll be hungry, but don't know whether an on-duty snack will be available, take along a candy bar, crackers, fruit, or nuts in your coat pocket—just in case.

Generally speaking, dates are o-u-t while baby sitting. Most parents feel that a sitter's attention can't be divided between their child and a date—with their child still getting the share they think he needs. Bring some homework or a good book to keep you company, especially if the family's new on your list and you don't know about their entertainment facilities. Later, when you've proved to the parents that you do a first-rate job, you might bring up the question of may-you-have-a-date. But, until then, such a question would make them doubt that you're taking your job as seriously as you should.

SPORTS

New Faces for 1953

WHEN you open your newspaper these days, you don't have to turn to the comics for laughs. You can get your chuckles right on the sport page. Just read those tall tales from the baseball training camps. You know how they read:

"Bill Pfumff, veteran Sox twirler, reported to camp two ounces lighter than he was at the end of the 1952 season. He says he's in the best shape of his life and is a cinch to win 20 games."

The wise fan knows better. He knows that nine-tenths of the training camp stories are baloney—very tasty, it's true, but still baloney. Only a handful of the spring training heroes make good every year.

Nevertheless, the rookies make good "copy." So many of them show up so well that you can hardly blame their managers for raving about them. Yet nine out of ten will wilt under fire.

Figuring who that tenth man will be makes exciting guessing. So let's sift through the 1953 rookie crop and try to figure which of them will make it "big" this year.

American League Rookies

The Yankee dreamboat is Bill Skowron, a brawny ex-Purdue grid star who murdered the ball at Kansas City last season. He batted .341 while leading the American Association in homers (31) and runs batted in (134). Only 22 years old, he may be left at K.C. for another year's seasoning.

Bill's teammate of last season, first baseman Don Bollweg, is sure to get a close look. A .325 long-ball hitter, he was picked the most valuable player in the league.

Cleveland is high on pitcher Dave Hoskins, a right-hander who won 22 games for Dallas and had a remarkable 2.12 earned-run average. Prize hitting hope is outfielder Dave Pope, up from Indianapolis with a .352 mark that won the American Association batting title. Another outfielder, Mike Lutz, copped the Eastern League batting title with a .321 mark.

The Red Sox will try to get desperately needed pitching help from George Uhaze, an 18-game winner at Albany (N. Y.), while Washington is counting on catcher Les Peden, who hit 18 homers for Los Angeles, and first baseman Roy Hawes, who clouted 20 round-trippers for Chattanooga.

The Tigers gaze fondly upon outfielder Rufe Crawford who socked 27 homers for Scranton and was voted the most valuable player in the Eastern League. Frank Carswell hit .344 for Buffalo, leading the International League in both batting and home runs (30). Shortstop Harvey Kuenn hit .340 at Davenport and .325 in 19 games at Detroit.

The big hope of the Browns is Bill Hunter, the Fort Worth shortstop for whom the club forked over $90,000 and three players. A .284 hitter, Bill is a terrific fielder. Other hopes are catcher Buck Baich, who banged .335 for Oklahoma City, and pitcher Bobo Holloman, a 16-game winner at Syracuse.

The White Sox only have eyes for pitcher Bob Keegan, who topped the International League with 20 victories and 27 complete games. Bill Wilson, returned from service, is a real sleeper. In 1950 he led the Southern Association in runs, homers (36), and runs batted in.

The Athletics are bringing up Tom Hamilton, whose .343 average won the South Atlantic batting crown, and two promising young pitchers. Marion Fricano won 17 at Ottawa and led the International League with a 2.26 earned-run average. John Mackinson won 16 games for a last-place team—Birmingham of the Southern loop.

National League Rookies

The apple of the Dodgers' eye is Junior Gilliam, a streak of light who was voted the most valuable player in the International League. He hit .301, scored 111 runs, and batted in 112 tallies. Right behind Junior is Don Zimmer, a flashy shortstop who hit .310 with 17 homers and 91 runs batted in at Mobile.

One of the aces in the Card deck is Jim Beavers, jumping into the majors all the way from Class D ball (Hazlehurst in the Georgia State loop), where he batted .363 with 21 homers and 108 runs batted in.

The Giants appear to have picked three plums in Daryl Spencer, the American Association all-star shortstop who hit .294 and slammed 27 homers; third baseman Rance Pless, who led the Southern Association with a fat .364; and catcher Ray Katt, a great defensive backstop who hit .304 at Minneapolis.

The Braves offer the sensational Jim Pendleton, International League all-star shortstop, plus: Jim Mainzer, a .326 hitting all-star shortstop from Wichita Falls; pitcher Don Liddle, who won 17 and lost only 4 with a 2.70 earned-run average at Milwaukee; and Chuck Tanner, who belted .345 at Atlanta.

Chief Red hopes are second baseman Johnny Temple who hit .306 for Tulsa; catcher Hobie Landrith, who batted .300 at Tulsa; and pitcher Barney Martin, who posted a 23-7 record at Columbia.

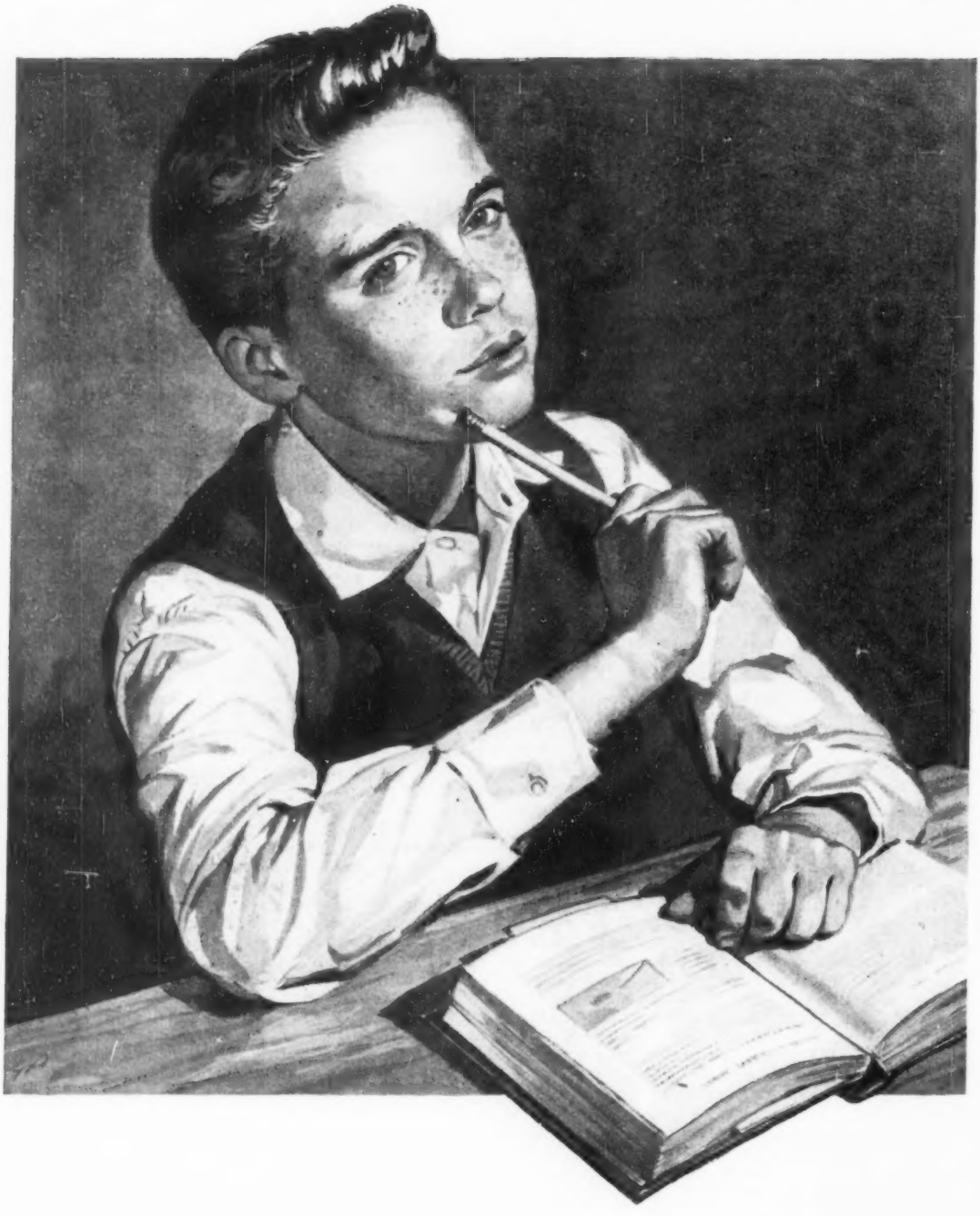
The Phillies are banking on Bob Greenwood, Western International League all-star pitcher with a 16-10 record including 23 complete games and an earned-run average of 2.45. Two other good young pitchers are Ron Mrozinski and John Sanford.

If the Pirates go anywhere this year, they'll get there because of outfielders Carlos Bernier, speed demon who hit .301 and stole 65 bases for Hollywood, and Frank Thomas, who hit .303, blasted 35 homers, and drove in 131 runs at New Orleans. Also watch out for Roy Face, who posted a 23-9 record and a 2.78 earned-run average in the Western League.

The pride and joy of the Cubs are young pitchers Fred Baczewski, Jim Willis, Vern Fear, and Cal Howe, all of whom were deadly in the minors.

HERMAN L. MASIN, *Sports Editor*

WANTED_



wide-awake day-dreamers

Where are these wide-awake day-dreamers, the Research Scientists of tomorrow? Right now they're in high school classrooms, preparing for their part in the Miracle of America.

Sinclair Research, in the endless search for new and better petroleum products, has an especial need for these young scientists when they are ready, offers them especially bright opportunities.

The famous Sinclair Plan is a typical example. Under this unique plan, Sinclair throws open its multi-million dollar research facilities to individual Americans, young or old, with worthy ideas for new or improved oil products or applications. The inventor must be protected at all times by a patent or patent application. Sinclair asks only the right to use the idea if the agreed work on the idea is completed and reported to the inventor. The inventor retains complete control and ownership.

Another example of Sinclair's continuing interest in the development of new scientists is the Sinclair Fellowship Program. Under this program, the Company sponsors promising graduate university students in such fields as chemistry, chemical engineering, geophysics, geology, petroleum engineering and catalysis.

At the present time, Sinclair Fellows are conducting these research projects at 13 colleges.

Why this heavy accent on youth?

Because Sinclair knows that Tomorrow's Scientist must come from Today's Youth—a youth who is dreaming today of a better tomorrow . . . *perhaps right in front of this page.*

SINCLAIR

A Great Name in Oil

SINCLAIR OIL CORPORATION
600 FIFTH AVENUE, NEW YORK 20, N. Y.

Don't let a BAD SKIN get you down!

Boys! Girls! Want to be popular? Of course, you do! Every normal human being wants to be liked and admired!

When teen-age skin problems threaten to spoil your good times, here's real help! Try this new way of cleansing your face with *medicated* Noxzema and water!

Teen-agers all over the country are thrilled with the way it helps heal externally-caused blemishes and helps skin look so much more attractive. See for yourself tonight:

1. Cleanse thoroughly—with Noxzema and water. Then just apply Noxzema to your face and neck; wring out a cloth in warm water and wash as if using soap. Notice how clean your skin looks! How much better it feels! Not dry or drawn!

2. At bedtime! Apply Noxzema over your whole face. You'll like its cool, pleasant tingle. Noxzema is not gummy! Not sticky! Doesn't show! Always pat a bit extra on any externally-caused blemishes to help heal them, fast! It's *medicated*. See if you don't notice a big improvement as you go on using this famous *greaseless, medicated* formula!

3. In the morning, wash again with *greaseless* Noxzema and water. Then apply Noxzema lightly over your whole face. It helps protect your skin all day—it's greaseless—no shiny nose.

Generous trial offer! Get regular 40¢ size for only 29¢ plus tax—at any drug or cosmetic counter. After you prove for yourself how Noxzema helps heal problem skin and helps *keep* your skin looking smooth and attractive, you'll always want to buy the big thrifty 10 oz. jar—only 89¢ plus tax.

IF YOU have any questions about improving your health and appearance, send them to: Ann White, "How's Your Health?" Editor, *Scholastic Magazines*, 351 Fourth Ave., New York 10, N. Y. Problems of greatest interest will be discussed in this column.

The Question Box

Q. Is it necessary to eat salads for good health? My family doesn't like salads, so we hardly ever have them.

A. For good health, you should eat some raw foods every day. It doesn't matter whether they're in the form of a salad, or eaten "out of hand," such as tomatoes, scraped carrots, celery stalks, etc. Raw vegetables provide you with vitamins and minerals which may be partially lost in cooking. Why not learn how to make salads that appeal to the family? Choose the raw vegetables they like best; cut or dice in small pieces and mix with a good salad dressing. Put the salad on the table as a first course, before everyone fills up on other foods. Soon they'll enjoy eating salads.

Q. Before I go to bed, I have a snack of one large tomato and farmer's cheese with a little salt. Can this hurt me?

A. On the contrary, such a snack will help you, not hurt you. The tomato gives you vitamins A and C, and the cheese provides essential protein and calcium. Neither food is "heavy" enough to interfere with sleep.

• • •

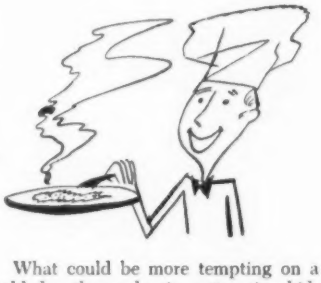
Fair Warning. Looked into the family medicine chest lately? It's a good idea—and a safety rule—to find out what's cluttering up the cabinet. Get rid of all old prescription medicines to make sure they won't be used by mistake. (Such medicines should be taken only by the person for whom they were prescribed, and only at the time the doctor ordered.) Be sure there is a good supply of first-aid material on hand—including sterilized cotton and gauze, bandaids, peroxide, iodine or other disinfectants. Tincture of iodine, by the way, gets very strong if it is kept too long. Date the bottle when you buy iodine, to be certain it won't get too old to use. And all medicine-chest products which are poisonous if taken internally should be marked with a large red crayon cross on the label.

• • •

Variety Act. Variety, at least once a week, is good for you. We're talking about "variety meats." That's the name given to meats like liver and kidneys.

There's a special reason why these meats are so good for you. You probably know that meats are an excellent protein food. Some foods contain a better grade of protein than others. Among meats, nutritionists have found that kidneys have the best proteins; liver rates second; and muscle meats, like steaks and chops, are third. In addition to containing top-ranking proteins, variety meats are also richer than other meats in vitamins, minerals, and blood-building factors.

Because they have a distinctive flavor, it would be tiresome to eat kidneys or liver every day. But at least once a week these foods in some form should be part of your diet.



What could be more tempting on a cold day than a luscious steaming kidney stew, or a beef and kidney pie? Or how about a flavorsome dish of liver, bacon, and onions, with a mound of fluffy mashed potatoes?

If you don't like the taste of plain liver, there's no reason to sidetrack this excellent meat. Just prepare it to suit your taste. Liver chopped with onion, celery, and parsley, and moistened with mayonnaise, makes a wonderful sandwich spread. Or ask your mother to have some liver ground into the beef she uses for a meat loaf.

For Pencil-chewers Only

You wouldn't eat from dirty dishes,
Yet dirty pencils taste delicious.
Pens and pencils are for writing—
They're not clean enough for biting!

CHIQUITA TO THE RESCUE
THIS WALK HOME IS WORSE EVERY DAY. I'M BEAT.
BOY, SO'M I. BY 3:00 I FEEL LIKE I'VE BEEN DIGGING A DITCH WITH A TEASPOON.
MY MARKS ARE SCRAPING BOTTOM.
FLUNK
YOU SHOULDA HEARD THE COACH BLOW UP TODAY. I REALLY THOUGHT I WAS FINISHED.
THINGS ARE LOOKING WAY DOWN. WHATTA WE DO NOW?
IT'S SIMPLE. TAKE A TIP FROM ME. HERE, DIG IN FOR SOME QUICK ENERGY.
WOW! CHIQUITA, YOUR BANANAS ARE POWER-PACKED. C'MON, BILL, I'LL RACE YOU HOME.
Teeners love fully ripe, energy-packed bananas! For a FREE copy of my banana song fill out and mail the coupon below.
United Fruit Company, Dept. SM
Pier 3, North River, New York 6, N. Y.
Please send me FREE Chiquita Banana's song.
NAME
ADDRESS
CITY
STATE

What Are 'Approvals'?

Scholastic Magazines accept stamp advertisements only from reliable and trustworthy stamp dealers. Our readers are advised to read an advertisement carefully before sending money for stamps. If the advertisement mentions the word "approvals," the stamp dealer will send you in addition to any free stamps, or stamps you pay for in advance, a selection of other stamps known as "approvals." Each of these "approval" stamps has a price clearly marked. If you keep any of the "approval" stamps you must pay for them and return the ones you do not wish to buy. When writing to stamp advertisers be sure to write your name and address on your letter and on the upper left hand corner of the envelope. If you do not intend to buy any of the "approval" stamps return them promptly, being careful to write your name and address in the upper left-hand corner of the envelope in which you return the stamps. Scholastic Magazines will do all in their power to protect their readers from unfair practices. Any reader who considers that he has been deceived as a result of his response to an advertisement in Scholastic Magazines is urged to appeal to the Executive Editor, Scholastic Magazines, 351 Fourth Ave., New York 10, N. Y.

300 STAMPS FOR ONLY 10¢
THIS MAMMOTH VALUE INCLUDES STAMPS WORTH UP TO 25¢! ALSO APPROVALS. WRITE TODAY!
MYSTIC STAMP CO., Camden 75, New York

327 DIFFERENT STAMPS 25¢ Including Early Canada, Newfoundland, British Colonies, Vatican, Red Russia, Hitler Heads, Indian States, Animals, Airmails, French Colonies, rarities, unusuals. Every stamp different. Rare bargain only 25¢ with our Bargain Approvals. Money back guarantee.
NIAGARA STAMP CO., Niagara-On-The-Lake 422, Can.

U. S. Classics—50 Yr. Old Collection
15 selected old timers. Each 50 or more years old—Most of 'em missing in even the biggest collections! Get all 15 of these unusual classics for less than 1¢ each. All yours for just 10¢! With your request for approvals.
JARO STAMP CO., Box 249-D, Church St. Annex, N. Y. 8

CANADIAN COLLECTION FREE!
Includes early Victorian Issues — Jubilee Issues — High Values — Commemoratives — Special Issues — Newfoundland and many Pictorials, etc., etc., together with large Philatelic Magazine—all FREE with approvals. Send 5¢ for postage. Empire Stamp Co., Dept. SB, Toronto, Can.

WOW! 203 All Different GERMANY 15¢
Zeppelins, Semipostals Airmails, High Values, etc., to new customers.
Jamestown Stamp Co., Dept. 510, Jamestown, N. Y.

FREE! "THE STAMP FINDER" Tells at a glance the country to which any stamp belongs. 32 pages illustrated. Includes valuable "Stamp Collector's Dictionary." Stamp Treasures and World's Ten Rarest Stamps. Also Approvals.
GARCELON STAMP CO., Box 1194, Calais, Maine

U. S. ARMY & NAVY HEROES
A collection featuring U. S. Army & Navy Heroes on stamps from War of 1812, Civil & Revolutionary and others. A Pictorial History. 10c with bargain U. S. approvals.
LOCUST STAMP CO., Box 205-Q, OSSINING, N. Y.

107 DIFFERENT 3c
Stamps from Cochin-Oceanic, Cameroun, Malta, Cyprus, etc., to Approval Buyers.
DIXIE STAMP CO., Dept. 44, Milwaukee 1, Wis.

FREE. $22.50 CATALOGUE VALUE
Raymax Plan offers free colorful collection catalogueing $22.50, plus Scott's International Stamp Album and many other big premiums, with approvals. Write today. 1c postage please.
RAYMAX, 70 AA Nassau St., New York 7, N. Y.

TWO BIG PICTORIAL SETS 5c
UNUSED STAMPS FROM THE VATICAN AND SAN MARINO TO THOSE REQUESTING OUR FINE APPROVALS
SILAS STAMP SERVICE
Box 55-S Triboro Sta., New York 35, N. Y.

GIVEN! Foreign Coin, Banknote and large illustrated coin list GIVEN to approval service applicants for 3c postage. BARGAINS! 3 Indianhead cents, 10c; Wooden nickel, 10c; Chinese Dollar, 53c
TATHAM COIN CO 92 SPRINGFIELD MASS

STAMPS

Canada's Wildlife Set

On April 1 Canada will issue three animal stamps for its national wildlife week, April 5-11. Canada has started a drive to stir up interest in the importance of protecting wildlife resources. Government officials report that Canada's wildlife is "being depleted at an alarming rate."

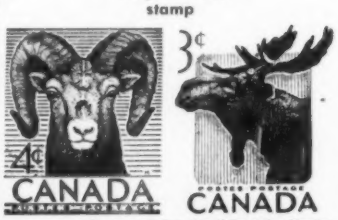
The three stamps show commonly known wild animals of Canada. The 2¢ blue pictures a polar bear, the 3¢ brown a moose, the 4¢ black a bighorn sheep. Stamps showing other wild animals will be issued every year in the future.

Canada recently issued an Indian totem pole stamp in black. The $1 stamp shows a totem pole and a Pacific Coast Indian house against a background of mountains. Totem poles were used by many North American Indians to record their tribes' history and customs. With great skill the Indians carved animals and gods on the poles.

STAMPING GROUNDS: On April 24 the United Nations will issue its first new stamp for 1953. It will be a "refugee" stamp—to serve as a reminder that many persons today are homeless and in great need. During the rest of 1953 the U. N. also will issue stamps paying tribute to United Nations Day, Human Rights Day, the Universal Postal Union, and a U. N. specialized agency.

Next week Japan will issue a stamp commemorating the 75th year since the first electric lights were used there. The stamp shows an old-fashioned arc lamp, the kind used before Edison invented the incandescent lamp in 1879.

The polar bear stamp



Courtesy of Canadian Information Service
The sheep and moose stamps

✓✓✓✓ Tops, don't miss. ✓✓✓Good. ✓✓Fair. ✓Save your money.

✓✓THE STARS ARE SINGING. (Paramount. Produced by Irving Asher. Directed by Norman Taurog.)

Rosemary Clooney fans will be delighted by the way their favorite singer handles herself in her first movie assignment. She's attractive in a relaxed, humorous way—bouncy but not boisterous. However, her fans are less likely to be enthusiastic about the improbable cornball that serves to introduce her. It demands that she take under her wing young Anna Maria Alberghetti, an illegal entry from behind the Iron Curtain, and get her on a television show to convince Americans that she should be allowed to stay over here.

Since Lauritz Melchior is also involved in this fantasy, there are frequent interruptions for vocal display—everything from *Vesti la Giubba* to *Come On-a My House* is dusted off by one or another of this ill-assorted trio.

Like a vaudeville, *The Stars Are Singing* tries to offer something for everybody, but it has hardly enough for anyone.

MOVIE CHECK LIST

The Movie Check List is printed each week as your movie-going guide. Here's how our check system works: **✓✓✓✓Tops, don't miss**—cream-of-the-crop films you're likely to remember for two or three years. **✓✓✓Good**—all-around, good entertainment; just short of being top-notch. **✓✓Fair**—interesting in part to some moviegoers. **✓Save your money**—dull, untrue, or even harmful.

Drama: ✓✓✓✓Breaking the Sound Barrier. ✓✓✓✓Above and Beyond. ✓✓✓✓My Cousin Rachel. ✓✓✓Member of the Wedding. ✓✓✓Wherever She Goes. ✓✓✓Face to Face. ✓✓Eight Iron Men. ✓✓Pony Soldier. ✓Angel Face. ✓Desperate Search. ✓Thief of Venice. ✓Thunder in the East. ✓Taxi.

Comedy: ✓✓✓✓The Importance of Being Earnest. ✓✓✓✓My Pal Gus. ✓✓✓The Promoter. ✓✓✓Androcles and the Lion. ✓✓✓The Stooge. ✓✓Never Wave at a WAC. ✓✓No Time for Flowers. ✓Abbott & Costello Meet Captain Kidd. ✓Babe in Bagdad. ✓The Clown.

Musical: ✓✓✓✓Hans Christian Andersen. ✓✓✓I Love Melvin. ✓✓✓Stars and Stripes Forever. ✓✓✓Road to Bali. ✓✓The Jazz Singer. ✓✓Million Dollar Mermaid. ✓✓All Ashore. ✓✓Meet Me at the Fair. ✓April in Paris. ✓Stop, You're Killing Me.

Animated Cartoon: ✓✓✓Peter Pan.

Reminder

She: "That engagement ring you gave me reminds me of a state capital."

He: "Which one, dear?"

She: "Little Rock."

Patuxent River Tester

Wish You Were Here!

While attending a dance with her favorite date, a young woman went to the powder room where she met several friends she hadn't seen for ages. The conversation, gay and gossipy, went on and on and on. Then the maid handed her a note from her date. In a bold, male hand were the words: "Can't understand why you haven't written."

Phillycue

The Last Laugh

Smart Guy (getting on bus): Well, Noah, is your ark full?"

Driver: "No, I'm short one donkey. Come on in."

Kessler News

Double Thanks

Delighted by the gift she had received, the lady spoke warmly to the boy:

"At church tomorrow, I'll thank your mother for this lovely pie."

"If you don't mind, ma'am," the boy suggested nervously, "would you thank her for two pies?"

Tab

Knot Exactly

In the heart of the Ozarks a motorist lost his way and inquired of a native, "Am I on the road for Kansas City?"

"Well," he said, "not exactly, bud. That road moseys along for a piece, then it turns into a hog trail, then a squirrel track and finally runs up a scrub pine and ends in a knothole."

Quote

The Learning Process

The youngster was impressed with his latest knowledge. "Mother," he shouted, coming home from school, "did you know that the earth is revolting on its abscess?"

Reveille

Study ART in MIAMI

Commercial, Fine Arts, Interior Design, Fashion Illustration, Fashion and Costume Design, Art in Advertising, Portrait, Still Life, Landscape. Rooms available reasonable rates. Inquire regarding time payment plan.

TERRY ART INSTITUTE

"America's Most Progressive Art Institution."

2323 S.W. 27th Avenue Miami, Fla.

Conscious

The master of ceremonies at a banquet table awakened a guest at his right by tapping his bald head with the gavel, while the last speaker was holding forth before a large and exhausted audience.

"Hit me again," the aroused snoozer loudly implored, "I can still hear him."

The Kablegram

Down on the Farm

Visitor: "So you run a duck farm. Business picking up?"

Farmer: "No, picking down."

Change of Mind

"Doctor," said the patient, "if there's anything wrong with me, don't frighten me half to death by giving it a long, scientific name. Just tell me in plain English what it is."

"Well," the doctor replied hesitantly, "to be perfectly frank, you're just plain lazy."

"Thank you, Doctor," the patient said. "Now will you give me the scientific name for that condition so I can tell the folks at home?"

Oral Hygiene

Voted Down

Phyllis Robson, editor of the English *Dog World*, relates that at a polling booth during a recent election a lady was seen going to vote with her dog.

A man nearby said to her: "I see you are going to exercise your franchise."

"This isn't a franchise," she retorted angrily. "It's a Welsh Corgi."

Your Dog

Geography Lesson

A nun told us, with evident glee, of a geography test among her 2nd and 3rd grade students in which she asked where the German people came from, the French people, the Italian, the English, etc.

All went well until she finally asked, "And where do the Irish come from?"

Then came the answer: "From Notre Dame!"

Information

Balance Due

A lady came into a Western Union office to file a telegram in which she used a few words over the minimum. "That's $1.64," the clerk told her. "You have 3 words over the 15 allowed."

"Oh, that's too high!" the woman exclaimed. "Besides, you owe me 3 words from the last telegram I sent."

True

Truce

The Chef's Special on the menu of an Atlanta, Ga., restaurant reads: "Yankee Pot Roast—Southern Style."

Blemishes

Cuticura helps clear them up fast

You'll be amazed how fast blackheads and externally caused pimples yield when you lather-massage with Cuticura Soap twice daily —apply Cuticura Ointment nightly—and use new "invisible" Cuticura Liquid during the day. Buy today sure.

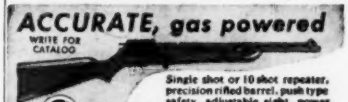
SENIORS Sell your classmates America's Most Beautiful and complete line of Modern GRADUATION NAME CARDS and earn sensational commission. Free Memory Book with each order. Write today for free sample kit.

PRINTCRAFT, Dept. S
1509 Maple St., Scranton 5, Pa.

CHICAGO ACADEMY of FINE ARTS Founded 1902

DIRECT PROJECT TRAINING
Commercial Art • Drawing
Fashion-Magazine Illustration
Interior Decoration • Cartooning
Dress Design • Painting
ALL PROFESSIONAL FACULTY
Write for free catalog Z
720 Rush St. • Chicago 11, Ill.

ACCURATE, gas powered
WRITE FOR CATALOG



Crosman

Single shot or 10 shot repeater, precision rifled barrel, push type safety, adjustable sight, power adjustment. .177 or .22 cal.

AT DEALERS EVERYWHERE

CROSMAN ARMS CO., Rochester 20, N.Y., Dept. 58

Buy U.S. Savings Stamps

FREE Book for Fishermen

completely NEW

100 pages of fishing tips — how to bait, fly, spin cast — fish pictures — records — tackle. *Write now.* FREE.

SOUTH BEND BAIT CO.
877 High, South Bend, Ind.

FREE-CAST® REEL with NEW SPEED CONTROL. No thumbing or backlashes. Adjusts for lure weight and wind. $11.

SOUTH BEND

"Situation well in hand"

The offer of Coca-Cola fits so many occasions
. . . greeting a friend, hospitality in the home,
relaxing with a fellow worker.
Whatever the circumstances,
the refreshing quality and taste delights
of ice-cold Coke please everyone.
Make *your* orders of the day . . . Coca-Cola.

COPYRIGHT 1953, THE COCA-COLA COMPANY

"COKE" IS A REGISTERED TRADE-MARK.

Teaching Aids

(Continued from page 2-T)

Procedure

Divide the class into six groups. Each group will have the responsibility of becoming familiar with the contents of one of the following advertisements: General Electric (page 37); General Motors (page 4); Bell Telephone (pages 29-32); Du Pont (page 2); Chrysler (pages 38-39); Sinclair (pages 42-43). Allow each group to study its ad for about 5 to 10 minutes, then follow up with class discussion.

Discussion Questions

1. It has been said again and again that America's new frontiers can be found in our science laboratories. What evidence did you find in the ads you studied to back up this statement?

2. How have General Electric, Du Pont, General Motors, etc., given us a more comfortable and richer America? (Call on each student group to give specific evidence based on the reading of a particular ad. As each group reports, the rest of the class can come in on the discussion with additional comment and interpretation.)

3. In what respects is the standard of living of the average American today much higher than the wealthiest of the nobility during the Middle Ages?

4. Why does a greater America of the future depend on the young people of today? In what ways do the various ads show how important America's young people are to the future growth of American business?

Activities

1. High school seniors can write to the personnel divisions of the several companies advertising in this issue to find out about job opportunities in these firms.

2. Ask students to "interview" their grandparents on the theme, "How is our standard of living today different from yours of 40 years ago?" Students can bring in stories of the days of the horse car, street lighting by gas lamp, the days of the Model T auto, etc.

3. Draw on information students have from seeing "period" movies and plays on TV and neighborhood theaters. Integrate this information with the flow of class discussion.

Quiz Answers

I. *Which Is Right:* 1-C; 2-B; 3-B; 4-A; 5-B; 6-D; 7-C; 8-A.

II. *Read and Tell:* (1) patent; (2) General Motors; (3) Chrysler; (4) The Jazz Singer; (5) true; (6) coaxial; (7) true; (8) Alexander Graham Bell.

III. *Science Frontiers:* 1-A; 2-A; 3-F; 4-F; 5-A; 6-A; 7-A; 8-F; 9-F; 10-F.

A *Quiz* on This Issue

I. WHICH IS RIGHT?

On the line to the left of each statement or question write the letter of the word or phrase which correctly completes the sentence or question.

__1. The President of the Massachusetts Institute of Technology is
(a) John T. Dorrance
(b) Alfred P. Sloan
(c) James R. Killian, Jr.
(d) George Eastman

__2. The number of engineers in the U. S. today is about
(a) 50,000 (c) 100,000
(b) 400,000 (d) 75,000

__3. Which statement is correct?
(a) There is a surplus of engineering students today.
(b) There is a great demand for engineers today.
(c) The field of engineering is closed to women.
(d) We have had too much technical progress already.

__4. Of the following companies which one is especially known for its research work in the field of glass and glass products?
(a) Corning
(b) General Electric
(c) Sinclair Oil
(d) Bell Telephone System

__5. Forty years ago
(a) the airplane industry was highly developed
(b) most homes had no electricity
(c) almost every home had a radio
(d) automobiles jammed the highways in heavy traffic.

__6. Each of the following jobs calls for knowledge and study of a lot of mathematics beyond high school except
(a) mechanical engineers
(b) chemists
(c) architects
(d) gasoline station attendant

__7. Which statement is true about aluminum as you learned about it in reading the radio drama?
(a) it is heavier than steel
(b) it is not strong enough to build bridges
(c) it is never found in nature as pure aluminum
(d) scientists never found a way to produce pure aluminum

__8. Three of the following fibers were produced by scientists in their research laboratories. Which one does nature produce?
(a) cotton (c) Dacron
(b) nylon (d) Orlon

II. READ AND TELL

The answers to the following questions will be found in the advertisements on the theme of industrial research and on career opportunities in science and engineering. Supply the correct answer on the line to the right of each question or statement.

1. The official government paper which an inventor gets to protect his rights to his invention is called a _____.
2. Which company lists Frigidaires as items of production in addition to its several types of automobiles? _____.
3. Which automobile company was the first to introduce the all-steel body car? _____.
4. Name the title of the first full length "talkie-movie." _____.
5. In a coast-to-coast television broadcast the television show travels part of the way over telephone lines. (True or false?) _____.
6. What is the name of the special telephone cable which allows several voices to be carried over a single pair of wires? _____.
7. It is now possible to make telephone calls from planes, trains, autos and ships at sea to your home. (True of false?) _____.
8. The man who invented the telephone is _____.

III. SCIENCE FRONTIERS

In the space to the left of each headline, write the letter *A* if it shows something already accomplished. Write the letter *F*, if it is something to be realized in the future.

__1. New Wonder Drug, Penicillin, Discovered to Fight Disease.
__2. Scientists Find Ways to Improve Quality of Poultry and Livestock.
__3. Atomic Energy Used to Light Up Entire City.
__4. Television-Telephone Phones Being Installed in Many Homes.
__5. Stainless Steel Available for Home and Industrial Use.
__6. New Fiber Made by Scientists from Coal, Air and Water.
__7. Planes Fly Without Human Pilots at Controls.
__8. Rocket Ship to the Moon Perfected.
__9. Atomic Energy Replacing Coal as Fuel.
__10. Doctors Discover Cause and Cure for Cancer.

IV. THINKING CAPS ON

Write a composition on the topic, "The pioneer of today is the scientist in his laboratory."

Off the Press

Extracurricular Activities, by Harry C. McKown. Macmillan, N. Y. 666 pp., $5.00.

The time is long since past when extracurricular activities in our high schools are viewed as newfangled fads and frills. There is still, however, abundant room for improving the activities which have gained a place in the secondary schools but are frequently imposed on teachers and students because it is the thing to do.

Dr. McKown, editor of *School Activities* magazine, is familiar with practices in extracurricular activities all over the nation. He keeps his feet on the ground and his sights on a workable program in chapters on the home room, student council, assembly, dramatics and music, clubs, athletics, school trips, school publications, and financial administration.

Dr. McKown has strong opinions, most of them fortified by experience. "The policy of excusing students from the home room to run errands," he states, "is about the most stupid thing imaginable."

There is little theory and much emphasis on the practical. Teachers and supervisors may gain a better perspective of what they are doing extracurricular-wise by consulting this sound volume.

The American Record in the Far East, 1945-1951, by Kenneth Scott Latourette. Macmillan, N. Y. 208 pp., $3.

Professor Latourette of Yale is at home in the Far East because of years of travel and residence there. In attempting a dispassionate survey of our record, he is performing a public service for the general reader.

The opening chapter provides the historical background, particularly since 1898, for our economic and cultural ties to the Far East. Latourette keeps an eye on Western Europe in explaining our foreign policy since the end of World War II. He is severely critical of Russian foreign policy, but has not given up hope for a peaceful solution to the present impasse. There are brief chapters on India, the smaller countries of southeast Asia, the Philippines, and Korea.

Much of the book describes our relations with China and Japan since the end of the war. Latourette is tolerant of the mistakes of our policy-makers and makes a conscious effort to be balanced in evaluating personalities. For example, he writes that "In General MacArthur the occupation had a director who in a remarkable way met the need of the Japanese at that particular time." Elsewhere he writes of MacArthur's dismissal, "President Truman . . . counted on the calm judgment of the majority eventually to rally to him."

This is not a book for scholars, but they will respect Latourette's optimism since it is based on long study of eastern Asia and a historian's perspective.

A Documentary History of the United States, by Richard D. Heffner. Paperbound edition, The New American Library, N. Y., 287 pp., 35¢. Hardcover edition, Indiana University Press, Bloomington, Ind., $3.

This is one of the first efforts by a university press to publish simultaneously a hard and soft covered edition of a book. The title is a good choice from the viewpoint of history teachers, because we need an inexpensive collection of documents from American history for superior students.

This volume is not as comprehensive as Commager's *Documents of American History*. It does offer a broad selection including the Declaration of Independence, the Constitution, *The Federalist*, Number 10, by Madison, Washington's Farewell Address, several Supreme Court decisions and Presidential inaugural addresses, one of the Turner essays on the frontier, the Cross of Gold speech, and the Marshall Plan.

It is unfortunate that the introductions to the selections presuppose a considerable knowledge of American history and will tend to confuse rather than assist the high school student who is unaccustomed to primary sources. But the documents themselves are worth the price of admission.

Forces Affecting American Education. 1953 Yearbook. Association for Supervision and Curriculum Development. A department of the National Education Association, Washington 6, D. C. 208 pp., $3.50.

Yearbooks are usually tame affairs. Not this one. The educators have decided to hit hard at the pressure groups which are seeking to undermine public education. They promise to gain the support of the great American public interested in fair play in the fight against the "self-appointed and self-annointed" cliques whose main weapons have been the big lie, . . . and financial support from those who "would push the schools back to the horse and buggy days."

Obviously, teachers alone are not going to be successful in winning the fight for public education. Willard Goslin, in "The People and Their Schools," observes that "The schools are at the center of nearly all the bitterly contested issues in American culture. . . . What happens to education will depend on how much of the power of the people is brought to its support." In "Groups Affecting Education," Robert Skaife names the enemies of education and suggests ways of identifying and combating them. He names the friends, too.

The power of mass media in affecting education is considered by Harold Benjamin. He notes that "The story of a psychopathic mother, striking an elementary school principal and breaking his glasses, is splashed over the front page with pictures . . . while the annual report of the president of the state Congress of parents and teachers is buried next to the stocks and bonds on page 17." There are, however, many newspapers, particularly in small communities, which give fuller and more sympathetic coverage to the schools.

Many of the attacks on the schools, particularly the lament about the passing of the Three R's, are based on little information. William Van Til shows how research can be a force affecting education. We must make clearer to the public that what we are doing is based on serious study, and that comparisons between the old and new ways of teaching children show that we are on the right track.

Within Our Power. Perspective for a Time of Peril, by Raymond B. Fosdick. Longmans, Green & Co., N. Y. 114 pp., $1.75.

If you are in one of your blue moods, this may be the book for you. Raymond Fosdick, retired head of the Rockefeller Foundation, offers us his philosophy of life. And it is a philosophy of hope. Much of his inspiration he derives from Woodrow Wilson with whom he was closely associated as Under Secretary of the League of Nations. He thinks of Wilson as an Isaiah whose message of reassurance for the oncoming generation was: "Say to them that are of a fearful heart: Be strong. Fear not." It is against fear that Fosdick inveighs in some of the most exalted paragraphs that have appeared in recent writing.

Freedom is being stifled, writes Fosdick, by the fear of atomic war, communism, and the "mood of violence" which has remained with us since the end of World War II. But he is not discouraged. Although our progress in human relations has not kept pace with scientific advance, Fosdick believes that there is still time. "If enough people are aroused to the menace [of a national breakdown], then the basis for some protective action can be laid."

—Howard L. Hurwitz